Glass Equipment and Spares & Consumables
Orwell Engineering Limited was established in 1964 working primarily with Pilkington Glass in the early years of their development of the Float Glass process. For the past 50 years the company has specialised in the production of precision machinery for the hot end of float glass production. This equipment has to operate for long periods in hostile conditions, often in temperatures of up to 1500 degrees centigrade. It is critical therefore that machining, fabrication, assembly and testing standards are maintained at the highest level. Orwell can guarantee this level of expertise.

Orwell Engineering Solutions is based in Liverpool within easy access of rail and motorways and also both Liverpool and Manchester international airports. We have a 40,000 sq. ft. workshop facility across two sites.

**In-house facilities include:**
- Large capacity CNC machines
- Precision fabrication facility
- Full sheet metalwork facility
- Full assembly facility
- Full Mechanical & Electrical commissioning
- Full site services & support

**Testing Division:**
- Helium search gas testing
- Hydraulic pressure testing
- X-ray testing

Since the development of float glass manufacturing and the beginning of the licensing era in the early 1960’s, Orwell Engineering has been involved with the development of equipment to meet the ever growing demand. Since those days, much of the equipment in use today on Pilkington float glass lines has been developed in our workshops working closely with Pilkington.

Over the decades, there have been many changes in design, materials and methods of manufacture to meet the current demand for quality and reliability.

Orwell has a thorough understanding of customers’ requirements and employs best practice procedures in equipment supply and operation.

We are extremely proud that currently the majority of float lines around the world are operating with Orwell equipment.

**Turn-key packages**
Orwell Engineering Solutions in conjunction with our electrical and control partners is able to offer full turn-key equipment supply packages.

**Manufacture**
All manufacturing is undertaken on Orwell premises using the latest in engineering technologies thereby ensuring our high standards are maintained.

Orwell Engineering is an approved helium testing company. All water-cooled equipment will be helium, hydraulically tested and test certificates issued. X-ray procedure by request.

**Commissioning & Supervision**
Orwell Engineering Solutions can offer equipment installation, site supervision and commissioning services to most countries worldwide.
Switchgear & Controls

Orwell Engineering Solutions provides many varied sectors of industry with solutions to their electrical power and control requirements.

Working in partnership with a leading electrical panel supplier, many of whose personnel are members of IET (Institute of Engineering & Technology) with a vast knowledge of power management and control systems, enables Orwell Engineering Solutions to offer professional advice and bespoke solutions to clients.

Orwell Engineering Solutions is involved in projects worldwide for clients producing and maintaining power and control systems:

Switchboards
Construction in modular style or fully welded.
ASTA & KEMA certification for bus bars and risers.
Manufactures are designed to comply with heat rise specifications.
Extensions and upgrades to clients existing power distribution systems.
Motor and Process Control Systems

Motor Control systems
Construction in modular style, fully welded, compartmentalized or ‘wardrobe’ multi-bay style.
Electrical and electronic control systems.
Electro-pneumatic control panels.
Variable speed drives applications.
Soft start and Star Delta assisted start motor panels up to 405 KW.
Direct on line and DOL reversing motor drive control panels.
Programmable logic control panels.
Process control instrumentation and monitoring.
All equipment is CE marked and supplied to current EU requirements and the following British standards:
BS-EN 60204-1
BS-EN 60439-1
BS-EN 60947-1
BS 7671: 2008

Along with the mechanical division, Orwell can also offer the following services:

<table>
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<tr>
<th>MACHINE</th>
<th>A full range of CNC and conventional machines.</th>
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<td>FABRICATION</td>
<td>Complete steel manipulation including sheering, cutting and bending.</td>
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<td>WELDING</td>
<td>MIG, TIG, electric arc, aluminium and brazing.</td>
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<td>FITTING</td>
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<td>SHEET METAL</td>
<td>A full range of CNC and conventional sheet metal equipment.</td>
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<td>TESTING</td>
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ABOUT THIS CATALOGUE

The purpose of this catalogue is to provide the float glass industry with a comprehensive and accessible spares system.

Most components in this catalogue are kept in stock by Orwell Engineering Solutions as finished or part finished items, and can be dispatched within 72 hours to anywhere in the world. Components not falling within this remit have availability information stated in the ‘additional information’ notes.

All aspects and options of importing & exporting can be carried out by Orwell, from ex-works to delivery into your stores.

This catalogue offers everything from the supply of complete equipment packages to all the spares and consumables required to keep the equipment in service.

If you do not see a particular item you require within the catalogue, please let us know. Just fill out the ‘unlisted items’ form in the rear of the catalogue and send it to us. We will supply the item, and will add it to the next edition of the catalogue.

Items are manufactured by ourselves ensuring quality, reliability and traceability. All proprietary components are purchased from proven reliable sources.

How does this benefit you?

1. Opportunity for customers to review the quantity level of site stock spares that need to be carried.

2. Quick and easy sourcing and availability of spares and consumables.

3. Fast delivery times. Orwell Engineering Solutions will quote a price and delivery within 24 hours of most enquiries.

4. Easy component identification.
INTRODUCTION

For nearly half a century, Orwell has been at the forefront of float glass equipment development, manufacture and supply.

During this period, Orwell has manufactured every piece of equipment in the Canal/Bath/Sealed Lehr areas as well as specific equipment for the Furnace, Lehr and cutting lines.

In fact, most float glass lines around the world have operated Orwell equipment and continue to do so today.

Orwell has been involved in the development and ongoing improvements of Float Glass Equipment and has unsurpassed knowledge not only of the manufacture of the equipment, but also of the hostile environment it is operating in, the function of the equipment and operating procedures.

FREE ADVICE SERVICE

Just ask us ..........

With all our knowledge and experience, our technical engineers now offer a free advisory service – so remember “It’s free to talk”

Chris Smith     chrissmith@orwell-engineering.co.uk
Peter Dixon     peterdixon@orwell-engineering.co.uk
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Tel: 00 44 (0)151 530 2000
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PART NUMBER RECOGNITION

E.g. **ORW/CO5/M/1-000/V**

**ORW**  Manufactured and supplied by Orwell Engineering Solutions Ltd
**C05**  Global bath area reference
**M**  Mechanical component
**E**  Electrical component
**1**  Equipment identification in C0 area
**000**  Equipment part identification number
**S**  Global standard part
**V**  Global variable part

Please refer to website www.orwell-engineering.co.uk for further updates.
CO1

Complete set of Canal Equipment
TECHNICAL DESCRIPTION

Orwell can manufacture and supply the complete canal package which will comprise of the canal casing, canal casing support steelwork, flat arch irons, shut off water box and canal crane (chain operated mobile crane unit).

COMPONENT VARIABLES

There are many variants on the design of the canal equipment. Technical discussions would be necessary and a complete set of the customer's drawings required for manufacture. Alternatively Orwell can also offer to design the full canal package and supply all components including the refractories.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

Generally there are no steel components on the canal equipment (apart from the flat arch irons and shut off water box) that would be required to be replaced during a glassmaking campaign.
CO1
Spout & Lip Casing
BATH EQUIPMENT

SECTION C01
EQUIPMENT CANAL
PART NUMBER ORW/C01/M/2-000/V
PART NAME SPOUT AND LIP CASING

TECHNICAL DESCRIPTION
Orwell can manufacture and supply the spout and lip casing to customer’s drawings.

COMPONENT VARIABLES
There are many variants on the design of spout and lip casings. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can also offer to design the spout and lip area and supply the casings complete with the refractory blocks.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

The water boxes of the casings are helium and pressure tested before passing acceptance.
CO1

Complete Tweel Raising Gear
BATH EQUIPMENT

SECTION C01
EQUIPMENT CANAL
PART NUMBER ORW/C01/M/3-000/V
PART NAME COMPLETE TWEEL RAISING GEAR

COMPLETE TWEEL RAISING GEAR

TECHNICAL DESCRIPTION
Orwell can manufacture and supply the complete tweel raising gear package which includes the wiring of the unit, manufacture and supply of the control panel and electrical testing of the unit prior to despatch.

COMPONENT VARIABLES
There are many variants on the design of the tweel raising gear. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can manufacture and supply the tweel raising gear to their own in-house design. Orwell can also supply refractory and / or steel tweels.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

Orwell do not carry any items used on the tweel raising gear as stock spares, as it is only in exceptional circumstances that any items would require replacing during a glass making campaign. Orwell can supply individual items for tweel raising gear refurbishment at cold repairs and we can also carry out full refurbishment of tweel raising gear equipment in our premises.
CO3
Exit Lip Plate
TECHNICAL DESCRIPTION

Orwell can manufacture and supply the exit lip plate including the supply of “Expamet” mesh (for site installation) and of the special welding rods required (for site welding of the lip plate to the end of the bath casing).

COMPONENT VARIABLES

There are several variants of exit lip plate design. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can manufacture and supply an exit lip plate to their own in-house design.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you. Lip plates are packaged for shipment in such a way as to minimise damage due to bending etc. Whilst exit lip plates are not a stock spare carried by Orwell, we can manufacture a lip plate within 4 to 6 weeks of receiving a purchase order and full manufacturing drawings. On a complete new build a spare lip plate is included as part of a standard supply package.

Welds on lip plates are fully dye penetration or X ray tested to customer specification.
TECHNICAL DESCRIPTION

Orwell Engineering Solutions can offer a complete bath blocking packing which includes the design of the bath blocking and detailing of individual blocks, supply of the bath blocks and supply of all the blocking ancillary items.

In addition Orwell can offer experienced supervisors to be on site to oversee and plan the bath blocking installation and also a specialist welding engineer to instruct and advise the installation team on the correct use of the stud welding machine, machine settings and the welding procedures.

ADDITIONAL INFORMATION

The client will be required to arrange the specialised local labour required for blocking installation including equipment to facilitate block handling. In addition the client will be required to identify a specialist local company capable of block cutting during the installation.

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you to discuss all aspects of the blocking package.
BATH EQUIPMENT

SECTION C04

EQUIPMENT BATH BLOCKING EQUIPMENT

PART NUMBER ORW/C04/M/1-000/V

PART NAME STUDS/NUTS/WASHERS/CARBON SLEEVES FOR BATH BLOCKING

TECHNICAL DESCRIPTION

This equipment is used at a new build and a bath repair to secure the bath bottom blocks to the bath casing.

The studs, nuts and washers are manufactured in heat resisting steel.

The graphite sleeves are manufactured in either CS grade graphite or HLM grade graphite.

The equipment is supplied as a set under the above part number, however items can be supplied individually under the following part numbers:-

Nuts - ORW/C04/M/1-001/S
Studs - ORW/C04/M/1-002/V
Washers – ORW/C04/M/1-003/S
Sleeves - ORW/C04/M/1-004/V

COMPONENT VARIABLES

The studs and graphite sleeves vary in length depending upon the depth of the bath block they are holding down. The lengths and quantity of each required must be specified by the customer.

ADDITIONAL INFORMATION

Ferrules are automatically included with the supply of studs.
TECHNICAL DESCRIPTION

The nuts are used at a new build and a bath repair to secure the bath bottom blocks to the bath casing. The nuts are M12 Hexagon Nuts manufactured in heat resisting steel.

COMPONENT VARIABLES

None

ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION C04

EQUIPMENT BATH BLOCKING EQUIPMENT

PART NUMBER ORW/C04/M/1-002/V

PART NAME STUDS FOR BATH BLOCKING

TECHNICAL DESCRIPTION

The studs are used at a new build and a bath repair to secure the bath bottom blocks to the bath casing.

The studs are manufactured in heat resisting steel, they are supplied in varying lengths dependent upon the bath block depth that they are to secure and have an M12 thread 75mm long on one end.

Ferrules are automatically included with the supply of studs.

COMPONENT VARIABLES

As the studs vary in length depending upon the depth of the bath block they are holding down, the lengths and quantity of each required must be specified by the customer.

ADDITIONAL INFORMATION

None
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<td>PART NAME</td>
<td>WASHERS FOR BATH BLOCKING</td>
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**TECHNICAL DESCRIPTION**

These washers are used at a new build and a bath repair to secure the bath bottom blocks to the bath casing. The washers are manufactured in heat resisting steel, their size is 65mm outside diameter x 5mm thick with a 14mm diameter hole in the centre.

**COMPONENT VARIABLES**

None

**ADDITIONAL INFORMATION**

None
BATH EQUIPMENT

SECTION C04
EQUIPMENT BATH BLOCKING EQUIPMENT
PART NUMBER ORW/C04/M/1-004/V
PART NAME CARBON SLEEVES FOR BATH BLOCKING

TECHNICAL DESCRIPTION
These sleeves are used at a new build and a bath repair and fit around the studs that secure the bath bottom blocks to the bath casing.

The sleeves are manufactured in either CS grade graphite or HLM grade graphite. They are 32mm outside diameter with a 14mm diameter hole through its whole length. One end of this 14mm diameter hole has a 3mm x 45° chamfer. The sleeve lengths vary dependent upon the bath block depth which they are holding down.

COMPONENT VARIABLES
The graphite sleeves vary in length depending upon the depth of the bath block they are holding down. The lengths and quantity of each sleeve required must be specified by the customer.

ADDITIONAL INFORMATION
None
BATH EQUIPMENT

SECTION C04
EQUIPMENT BATH GRAPHITE SIDELINERS
PART NUMBER ORW/C04/M/1-005/V
PART NAME SIDELINER STRAPS

TECHNICAL DESCRIPTION
The straps are used to secure the bath graphite sidewalls in position.

There are two differing designs of sideliner straps available:

DESIGN 'A' – is a 'T' shaped strap that is screwed into the graphite sideliner to secure the sideliner in position.

DESIGN 'B' – is a straight rectangular bar with a pin through at one end which locates into a hole in the graphite sidewall, this design relies upon the buoyancy of the sideline in the tin holding the sideliner in place. This design allows for the replacing of damaged graphite sidewalls "on the run".

The sideliner straps are manufactured in heat resisting steel grade 304L.

COMPONENT VARIABLES
A manufacturing drawing of the strap required should be provided by the customer along with the quantity required.

If straps to Design 'A' are required the customer should also state if holding down screws are also required.

ADDITIONAL INFORMATION
None
# TECHNICAL DESCRIPTION

The stud welding machine is an inverter power source which has been developed especially for stud welding. The machine operates with a 400V, 50/60Hz power supply. The machine comes supplied with the recognised stud welding gun, cables, specially designed adaptors to fit the studs and operating manual.

# ADDITIONAL INFORMATION

A specialist welding engineer can be made available for a site visit to provide training on the stud welding operation or to carry out full stud welding of the bath blocks.
BATH EQUIPMENT

SECTION C04
EQUIPMENT BATH CARBONS
PART NUMBER ORW/C04/M/1-007/V
PART NAME SIDELINER/BARRIER/FLAG CARBONS

TECHNICAL DESCRIPTION

Orwell can supply the full package of carbons required for the build of the float bath or spares as required during the glass making campaign.

The carbons are manufactured in either CS grade graphite or HLM grade graphite.

The equipment is supplied as a set under the above part number, however items can be supplied individually under the following part numbers:-

Sideliners - ORW/C04/M/1-007/A
Barriers - ORW/C04/M/1-007/B
Submerged Flags - ORW/C04/M/1-007/C
Full Depth Flags - ORW/C04/M/1-007/D

COMPONENT VARIABLES

The customer will be required to provide dimensional details of the graphite pieces required. This can be in the form of drawings, sketches or written dimensional sizes.

ADDITIONAL INFORMATION

Due to the many possible dimensional variations, these components are not a stock spare carried by Orwell. Orwell can generally have components available with 8 weeks or earlier.
**BATH EQUIPMENT**

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<td>COMPLETE SEALED LEHR</td>
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**COMPLETE SEALED LEHR**

**TECHNICAL DESCRIPTION**

The complete sealed lehr is available to purchase and will comprise of the dross box, hood & drape raising gear and all ancillary items.

**COMPONENT VARIABLES**

There are many variants on the complete sealed lehr. Technical discussions would therefore be necessary.

**ADDITIONAL INFORMATION**

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
TECHNICAL DESCRIPTION

A drape is a fabricated curtain comprising of a crimped stainless steel corrugated foil secured at the top between two rolled section angle pieces (25 x 25 x 3) and 25 wide strips of glass fibre tape which form a flange to allow the drape to sit inside the drape carrier within the sealed lehr hood, and clamped at each end between steel plates. There are 4 drapes located in the sealed lehr hood one above each lift out roller and one over the exit lip blocks helping to prevent ingress of oxygen into the exit end of the bath.

There is also one drape fitted to the front of the lehr above roller No. 4 or 5 (depending upon the lehr entrance design.

All steel material used on the drape is heat resisting steel grade – 321S31.

COMPONENT VARIABLES

The customer is required to provide a detail drawing of the drape as drapes can vary depending upon the sealed lehr design.

ADDITIONAL INFORMATION

Due to the environment in which they operate, drapes are a piece of bath equipment that can require replacing at regular intervals. Bath exit end breaks can also cause damage to drapes resulting in replacement being necessary. Unless damaged beyond reasonable re-use, it is normal practice to just renew the crimped drape material and retain the clamping angles and other plates which secure the crimped material.
**TECHNICAL DESCRIPTION**

Stainless steel foil corrugated vertically from which the main curtain of the drape is made. There are 4 drapes located in the sealed lehr hood helping to prevent ingress of oxygen into the exit end of the bath.

There is also one drape fitted to the front of the lehr above roller No. 4 or 5 (depending upon the lehr entrance design).


Foil thickness 0.15mm.

Corrugations – 6mm pitch, 1.5mm overall thickness.

**COMPONENT VARIABLES**

The customer is required to specify the roll length required (in metres) and the material width required (in mm).

The material width dimension should include the 25mm of foil clamped between the 25 x 25 x 3mm clamping angles at the top of the assembled drape.

**ADDITIONAL INFORMATION**

None
TECHNICAL DESCRIPTION

This bearing unit is a water cooled unit commonly called “out rigger bearing” and is mounted either side of the dross box on the “L” shaped side plate away from the dross box and supports the lift out roller.

There are six bearing units on a dross box (two for each lift out roller). The complete unit comes with gun metal bearings, oil thrower ring, oil filler cap, oil bath drain plug and dipstick.

The bearing housing is water cooled.

All material is mild steel with the exception of the bearing brass which is gun metal BS 1400LG-2C grade.

The finished bearing housing water box is helium leak tested and then hydraulically pressure tested to 6.5 bar. The oil bath housing is leak tested using paraffin.

COMPONENT VARIABLES

This is a standard component. The customer however should confirm the diameter of the lift out roller journal ends.

ADDITIONAL INFORMATION

The gun metal bearings will over a glassmaking campaign and for a variety of reasons wear out.
BATH EQUIPMENT

SECTION C05
EQUIPMENT SEALED LEHR
PART NUMBER ORW/C05/M/1-005/S
PART NAME LIFT OUT ROLLER BEARING UNIT
(DROSS BOX FLANGE MOUNTED TYPE)

TECHNICAL DESCRIPTION

This bearing unit is bolted to the side plate which is mounted flat against the dross box side and supports the lift out roller on each side of the dross box.

There are six bearing units (two for each lift out roller). The complete unit comes with gun metal bearings, oil thrower, oil bath drain plug and dipstick.

The bearing housing is water cooled.

All material is mild steel with the exception of the bearing brass which is gun metal BS 1400LG-2C grade.

The finished bearing housing water box is helium leak tested and then hydraulically pressure tested to 6.5 bar. The oil bath housing is leak tested using paraffin.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The gun metal bearings will over a glassmaking campaign and for a variety of reasons wear out.
BATH EQUIPMENT

SECTION C05
EQUIPMENT SEALED LEHR
PART NUMBER ORW/C05/M/1-005/S
PART NAME LIFT OUT ROLLER BEARING UNIT
(DROSS BOX FLANGE MOUNTED TYPE)

TECHNICAL DESCRIPTION

This bearing unit is bolted to the side plate which is mounted flat against the dross box side and supports the lift out roller on each side of the dross box.

There are six bearing units (two for each lift out roller). The complete unit comes with gun metal bearings, oil thrower, oil bath drain plug and dipstick.

The bearing housing is water cooled.

All material is mild steel with the exception of the bearing brass which is gun metal BS 1400LG-2C grade.

The finished bearing housing water box is helium leak tested and then hydraulically pressure tested to 6.5 bar. The oil bath housing is leak tested using paraffin.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The gun metal bearings will over a glassmaking campaign and for a variety of reasons wear out.
BATH EQUIPMENT

SECTION C05
EQUIPMENT SEALED LEHR
PART NUMBER ORW/C05/M/1-006/S
PART NAME SOLID GUN METAL BEARING BRASSES
(DROSS BOX FLANGE MOUNTED TYPE)

TECHNICAL DESCRIPTION
The bearing brasses are solid one piece brasses for use in the flange mounted housing.
Gun metal bearing material – Grade BS 1400LG-2C
The inside diameter of the bearing brass is 108.108/108.054mm.

COMPONENT VARIABLES
This is a standard component, however if required by the customer the inside diameter can be machined to a different tolerance than that shown above. In such cases the customer should specify the change when ordering.

ADDITIONAL INFORMATION
The gun metal bearings will over a glassmaking campaign and for a variety of reasons wear out.
**BATH EQUIPMENT**

**SECTION**  
C05

**EQUIPMENT**  
SEALED LEHR

**PART NUMBER**  
ORW/C05/M/1-007/S

**PART NAME**  
LIFT OUT ROLLER BEARING OIL THROWER

---

**TECHNICAL DESCRIPTION**

The oil thrower is a mild steel ring that can be split for assembly and fits through the bearing brass. As the thrower rotates it drags oil from the bearing housing oil bath and lubricates the brass bearing.

- Oil ring outside diameter – 156mm
- Oil ring inside diameter – 150mm
- Oil ring width – 10mm

**COMPONENT VARIABLES**

This is a standard component.

**ADDITIONAL INFORMATION**

The thrower is the same for both the outrigger and flange mounted bearings.
BATH EQUIPMENT

SECTION C05
EQUIPMENT SEALED LEHR
PART NUMBER ORW/C05/M/1-008/S
PART NAME COMPRESSION SPRINGS

TECHNICAL DESCRIPTION

The compression springs form part of the lift out roller installation assembly and they are located inside the dross box side plate and by means of retaining and pressure plates are used to push the lift out roller end face carbon seal up against the roller body end. There are two compression springs on each side of the lift out roller.

Compression spring material – Inconel X750
Spring inside diameters – 175mm & 150mm
Spring wire diameter – 4.76mm
Spring length – 150mm free length
Number of coils – 9

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The springs will over a glassmaking campaign due to the environment in which they are operating in lose some of their compression strength and require replacing. Older plants may have springs made from Nimonic 90, this material has now been superseded by Inconel X750.
The leaf spring assembly is installed generally beneath lift out roller Nos.1 & 2 in the cast iron channel section. Carbon face seals sit on top of the leaf springs such that the thrust of the leaf spring pushes the face seal up against the roller body.

Leaf spring material – heat resisting steel 304L

Steel thickness – 2.64mm

Spring thrust ~ 9 Kg

Note: In addition to supplying full leaf spring assemblies, Orwell can also supply the individual springs (single & double) which the customer can then rivet themselves to an existing backing strip. This method may be more attractive to the customer as it keeps packing and carriage costs to a minimum.

To order just individual springs please quote the following part numbers:

ORW/C05/M/1-009/A – for the single spring

ORW/C05/M/1-009/B – for the double spring

Whilst the individual spring detail is standard (single and double springs), a detail drawing of the leaf spring assembly giving the overall length of the spring backing plate and the spring fixing hole configuration is required from the customer.

The springs will over a glassmaking campaign due to the environment in which they are operating in lose some of their thrust strength and will require replacing. Springs used to be manufactured in stainless steel 321S31 but this is no longer available.
BATH EQUIPMENT

SECTION C05
EQUIPMENT SEALED LEHR
PART NUMBER ORW/C05/M/1-010/S
PART NAME BELLOWS UNIT ASSEMBLY

TECHNICAL DESCRIPTION

The bellows unit is screwed into the front recess of the dross box sideplate and houses split graphite face seals which fit around the lift out roller journal end in order to provide a good seal.

The bellows unit comes supplied as a complete assembly with extended collars fitted to the bellows, one end of the bellows piece is fully welded to the locating collar to which comes bolted the split locating plates with spacer fitted. The other end of the bellows piece comes fully welded to the retaining plate which bolts into the front recess of the dross box sideplate. The unit comes ready to fit and bolt in to the dross box sideplate.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The spare is offered as a full assembly. This is because it is extremely difficult on site and not cost effective to attempt to try and remove an old bellows piece and retain the existing flanges for re-use. However if required just the bellows piece can be supplied.

The carbon face seals that fit inside the bellows locating collar are not supplied as standard with the bellows unit. Orwell can supply the carbon seals if requested by the customer.
BATH EQUIPMENT

SECTION      C05
EQUIPMENT    SEALED LEHR
PART NUMBER   ORW/C05/M/1-011/V
PART NAME    HAIRPIN COOLER

TECHNICAL DESCRIPTION
The Hairpin Coolers are situated under No. 1 & 2 lift out rollers in the cast iron Channels

COMPONENT VARIABLES
The Hairpin Cooler length can vary.

ADDITIONAL INFORMATION
None.
BATH EQUIPMENT

SECTION     C05
EQUIPMENT   SEALED LEHR
PART NUMBER  ORW/C05/M/1-012/V
PART NAME   CAST IRON CHANNEL SEALING COPPER GASKETS

TECHNICAL DESCRIPTION
The Copper Gaskets form the seal between the end of the cast iron channels and the Dross Box End Plates.

COMPONENT VARIABLES
The dimensions of the copper gasket can differ between different size dross boxes. Therefore a drawing or sketch would be required.

ADDITIONAL INFORMATION
None.
TECHNICAL DESCRIPTION

Along with the Copper Gaskets, the mild steel plates form the seal between the cast iron channels and the Dross Box end plates.

COMPONENT VARIABLES

The dimensions of the steel plates can differ between different sized Dross Boxes. Therefore a drawing or sketch would be required.

ADDITIONAL INFORMATION

None.
# BATH EQUIPMENT

## SECTION
- C05

## EQUIPMENT
- SEALED LEHR

## PART NUMBER
- ORW/C05/M/1-014/V

## PART NAME
- BEARING MOUNTING FACE PLATE

![Image of BEARING MOUNTING FACE PLATE]

## TECHNICAL DESCRIPTION
The Bearing Mounting Face Plate is fixed to the Dross Box End Plate. The Water Cooled Bearing Mounting and Carbons are fixed to the plate.

## COMPONENT VARIABLES
There are two types of Face Plate, side mounted and out rigger. There are also dimensional differences, therefore a drawing or sketch would be required.

## ADDITIONAL INFORMATION
None.
TECHNICAL DESCRIPTION

The Silicone Rubber Seal forms a seal between the Aluminium doors and the Dross Box Side Plate.

COMPONENT VARIABLES

The dimensions of the seal can vary, therefore a drawing or sketch would be required.

ADDITIONAL INFORMATION

The seals can harden and shrink over a period of time.
BATH EQUIPMENT

SECTION  
C05

EQUIPMENT  
SEALED LEHR

PART NUMBER  
ORW/C05/M/1-016/V

PART NAME  
DROSS BOX ALUMINIUM DOORS

TECHNICAL DESCRIPTION

The Dross Box doors enclose the chambers at the end of the unit.

COMPONENT VARIABLES

The dimensions of the Aluminium Doors can vary, therefore a drawing or sketch would be required.

ADDITIONAL INFORMATION

None.
BATH EQUIPMENT

SECTION       C05
EQUIPMENT     SEALED LEHR
PART NUMBER   ORW/C05/M/1-017/V
PART NAME     DROSS BOX CHANNELS

TECHNICAL DESCRIPTION

These dross box channels are designed to be replaceable should the need arise and are bolted from the underside of the dross box into the steel fabricated sections inside the dross box beneath each lift out roller. The channels form the housing into which the leaf springs and lift out roller sealing graphites are fitted. The channels are one piece cast iron grade BS250 and are machined to the customers drawing specification.

COMPONENT VARIABLES

The channels will vary in length and depth depending upon the dross box size and design. A manufacturing drawing would be required from the customer.

ADDITIONAL INFORMATION

The customer should state whether holding down bolts and washers are also required.
CO5
Lift Out Roller Drive Unit
TECHNICAL DESCRIPTION

The mechanical lift out roller drive situated in the Lehr Gap area driving No 1, 2 & 3 Lift out rollers.

COMPONENT VARIABLES

There are many variants on the complete Lift Out Roller Drive. Technical discussions would therefore be necessary.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
BATH EQUIPMENT

SECTION C05
EQUIPMENT LIFT OUT ROLLER DRIVE
PART NUMBER ORW/C05/M/2-001/V
PART NAME DRIVE SHAFT TO LIFT OUT ROLLER

TECHNICAL DESCRIPTION
The drive shaft forms and facilitates the connection between the roller drive gearbox on the lift out roller drive unit and the lift out roller journal. The drive shaft is a “Hardy Spicer” heavy duty prop shaft type BRD 52 Reference No. 52 AE 02 – compressed length 475mm.

COMPONENT VARIABLES
The customer is required when ordering to confirm the compressed length as 475mm.

ADDITIONAL INFORMATION
None
BATH EQUIPMENT

SECTION C05
EQUIPMENT LIFT OUT ROLLER DRIVE
PART NUMBER ORW/C05/M/2-002/V
PART NAME DRIVE SHAFT FROM LEHR DRIVE

TECHNICAL DESCRIPTION
The drive shaft forms and facilitates the connection between the lehr drive transfer gearbox and the lift out roller drive unit. The drive shaft is a “Hardy Spicer” heavy duty prop shaft type BRD 62 Reference No.62 AE 01.

COMPONENT VARIABLES
The customer is required to provide a detail drawing of the drive shaft showing the minimum and maximum compressive lengths and also showing the flange details at each end of the drive shaft.

ADDITIONAL INFORMATION
None
### TECHNICAL DESCRIPTION

A new “Renold” gearbox Reference UO 35 is only available on a long delivery schedule (approximately 20 weeks) at standard cost. Orwell can however obtain new gearboxes within approximately 13 weeks but this comes at a cost premium (up to date cost comparisons on request). Orwell can also offer to supply a refurbishment kit of new worm and wheels, bearings and oil seals for our customers to refurbish their existing gearboxes. These kits are available on an 8 week delivery.

The gearbox is a “Renold” UO 35 overdriven type left hand or right hand assembly.

### COMPONENT VARIABLES

The customer is required to specify whether the gearbox required is a left hand assembly (assembly 11) or a right hand assembly (assembly 12).

### ADDITIONAL INFORMATION

None
CO6
Complete Side Sealing Package
BATH EQUIPMENT

SECTION       C06
EQUIPMENT     SIDE SEALING
PART NUMBER   ORW/C06/M/1-000/V
PART NAME     COMPLETE SIDE SEALING PACKAGE

Selection of Typical Side Seals

TECHNICAL DESCRIPTION
The side sealing package provides a complete sealing system between the bath and roof casings. Orwell can manufacture and supply all shapes and sizes of side seals to the customer’s manufacturing drawings.

COMPONENT VARIABLES
There are many variants on side seal. Technical discussions would therefore be necessary.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
TECHNICAL DESCRIPTION

These seals are used on the tin thermocouple side seal to seal around the thermocouple stem on installation through the seal.

A moulded cylindrical silicone rubber seal.

Seal diameter = 67mm & 44mm.

Bore diameter = 19mm.

Counterbore = 52mm diameter x 16mm deep.

Overall length = 41mm with 22mm shoulder.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The physical dimensions of the gland may vary slightly due to shrinkage over a period of time, this is normal.
BATH EQUIPMENT

SECTION C06
EQUIPMENT SIDE SEALING
PART NUMBER ORW/C06/M/1-002/S
PART NAME TIN THERMOCOUPLE PROBE SOCKETS

TECHNICAL DESCRIPTION
These sockets are used on the tin thermocouple and tin / oxygen probe side seals. They are screwed onto the boss around the side seal inlet to provide a mating surface for the silicone seal gland to seal up against.

Material used mild steel.
Socket outside diameter = 52mm.
Socket bore diameter = 1¼” BSP thread.
Overall length = 50mm.

COMPONENT VARIABLES
This is a standard component.

ADDITIONAL INFORMATION
None
**BATH EQUIPMENT**

**SECTION**  
C06

**EQUIPMENT**  
SIDE SEALING

**PART NUMBER**  
ORW/C06/M/1-003/S

**PART NAME**  
TIN THERMOCOUPLE SLEEVES

---

**TECHNICAL DESCRIPTION**

These sleeves are used on the tin thermocouple side seal to provide a guide for the insertion of the thermocouple into the side seal. The sleeve screws into the socket piece which in turn is screwed onto the side seal inlet hole for the thermocouple insertion.

- Material – Heat resisting steel grade 304L.
- Sleeve outside diameter = 30mm.
- Sleeve bore diameter = 23mm.
- Flange diameter = 1 1/4” BSP thread x 18mm long.
- Overall length = 100mm.

---

**COMPONENT VARIABLES**

This is a standard component.

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**ADDITIONAL INFORMATION**

None
**BATH EQUIPMENT**

**SECTION**
C06

**EQUIPMENT**
SIDE SEALING

**PART NUMBER**
ORW/C06/M/1-004/S

**PART NAME**
TIN/OXYGEN PROBE SILICONE GLAND SEAL

---

**TECHNICAL DESCRIPTION**

These seals are used on the tin / oxygen side seal to seal around the tin / oxygen probe stem on installation through the seal.

A moulded cylindrical silicone rubber seal.

Seal diameter = 67 & 44mm.

Bore diameter = 28mm.

Counterbore = 52mm diameter x 16 deep.

Overall length = 41mm with 22mm shoulder.

---

**COMPONENT VARIABLES**

This is a standard component.

---

**ADDITIONAL INFORMATION**

The physical dimensions of the gland may vary slightly due to shrinkage over a period of time, this is normal.
BATH EQUIPMENT

SECTION C06

EQUIPMENT SIDE SEALING

PART NUMBER ORW/C06/M/1-005/S

PART NAME PUSHER / FENCE SEAL BELLOWS

TECHNICAL DESCRIPTION

The bellows provides a means of sealing around a pusher / fence pipe whilst allowing some axial movement of the pipe when inserted into the bath. One end of the bellows is secured around the side seal inlet stub pipe by means of a hose clip. The other end of the bellows is brazed onto the cooling pipe housing flange containing a graphite bush which forms a seal around the cooling pipe helping to prevent oxygen ingress into the bath.

The bellows material is heat resisting steel grade 321S31.

Bellows length = 170mm.

Convoluted length = 110mm having 18 convolutions.

Flange length at side seal end = 20mm x 102mm inside diameter.

Flange length at housing end = 40mm x 72mm inside diameter.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION C06
EQUIPMENT SIDE SEALING
PART NUMBER ORW/C06/M/1-006/V
PART NAME BLANK SIDE SEAL SECTION

TECHNICAL DESCRIPTION
The standard blank side seal section used to seal between the bath casing and bath roof.
Side seal length = 303mm and 606mm.
Side seal overall height = 300mm and 340mm.
Seal depth = 63mm front face plus 244mm box section depth.
Materials – box section part is heat resisting steel grade 304L, front face of seal is mild steel.
All insulation material is body soluble fibre.

COMPONENT VARIABLES
The customer is required to specify the width of the seal section required (mm) and also the height of the seal section required (mm).

ADDITIONAL INFORMATION
A blank side seal of a different length or height to the above stock sizes can be manufactured within 48 hours as all materials are held in stock.
**BATH EQUIPMENT**

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**TECHNICAL DESCRIPTION**

The Bellow & Silicone Gland forms a seal around the tin cooler equipment.

**COMPONENT VARIABLES**

This is a standard item.

**ADDITIONAL INFORMATION**

None
CO6
Motorised Positioner Units
# BATH EQUIPMENT

## SECTION
C06

## EQUIPMENT
MOTORISED POSITIONER UNIT

## PART NUMBER
ORW/C06/M/2-000/V

## PART NAME
MOTORISED POSITIONER UNIT

## TECHNICAL DESCRIPTION
Orwell can manufacture and supply motorised positioner units, these units are supplied with the brackets for bath side mounting. The units are used to remotely position the carbon pushers and fences in the bath. Orwell can also supply a pair of units without the bath side mounting bracket for use with ribbon edge burner equipment.

## ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

Generally the equipment that is mounted onto the positioner units (water cooled pipes for fences and pushers etc) is supplied as a separate package, but Orwell can supply these as part of the positioned unit package if required by the customer.
TECHNICAL DESCRIPTION

The air motor drives the carriage of the motorised positioner unit onto which the pusher or fence units are mounted enabling the pushes and fences to be remotely positioned relative to the glass ribbon inside of the bath. The air motor is a ‘Gast’ motor reversible type reference 1UP-NRV-10.

ADDITIONAL INFORMATION

The air motor is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 6 weeks or earlier.
BATH EQUIPMENT

SECTION C06
EQUIPMENT MOTORISED POSITIONER UNIT
PART NUMBER ORW/C06/M/2-002/V
PART NAME PNEUMATIC SPARES

TECHNICAL DESCRIPTION
The pneumatic circuit of the positioner units contain a variety of valves (spool, poppet shuttle and solenoid). The components are very robust and failure of these items is very unlikely in a glass making campaign. These items are not carried as stock spares by Orwell, but Orwell can generally supply spares within 4 weeks or earlier.

ADDITIONAL INFORMATION
The particular spare will required to be clearly identified, each valve has a model number marked on it for ease of identification.
## BATH EQUIPMENT

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### TECHNICAL DESCRIPTION

Mounted on the positioner unit pneumatic panel, the filter/regulator/lubricator assembly cleans, controls and lubricates the incoming compressed air into the pneumatic system of the positioned unit.

### COMPONENT VARIABLES

None

### ADDITIONAL INFORMATION

The filter/regulator/lubricator assembly is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
CO6
Section ‘O’
Sealing Frame
BATH EQUIPMENT

SECTION C06
EQUIPMENT BATH SIDE SEALING
PART NUMBER ORW/C06/M/3-000/V
PART NAME FRONT LINTEL SEALING FRAME

COMPLETE FRAME AND SUPPORTING STEELWORK

TECHNICAL DESCRIPTION
The front lintel sealing frame is attached to the bath roof casing and forms a seal upstream of the front roof lintel in the area commonly referred to as "Section O". The frame is a steel fabricated structure that is fully welded to the bath roof casing. The frame houses refractory blocks which are designed to fit and seal around the bath roof inlet lintel.

COMPONENT VARIABLES
Orwell can manufacture to the customer’s design drawings, or alternatively Orwell can offer their own in-house design for this unit.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

The supply of the refractory blocks by Orwell is optional.
BATH EQUIPMENT

SECTION C07
EQUIPMENT OVERHEAD COOLERS
PART NUMBER ORW/C07/M/1-000/V
PART NAME BATH COOLERS

COMPLETE SET OF COOLERS
FOR USE IN THE BATH

TECHNICAL DESCRIPTION
Orwell can manufacture and supply all types of coolers used in the float bath (hot end rail coolers, hot end split banjo coolers, narrow end parallel coolers and narrow end banjo coolers) for new builds and cold repairs. The coolers are manufactured to customer’s manufacturing drawings and can be supplied with helium and pressure test certificates (on request).

COMPONENT VARIABLES
There are several variants on the design of bath coolers. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

Orwell can test coolers to customer’s specifications, generally Orwell helium leak test and pressure test all coolers prior to despatch.

There are generally no spares associated with coolers and Orwell do not carry coolers as a spares stock item due to design variances. Replacement individual coolers can be manufactured by Orwell within 10 working days or earlier of receiving a customer’s official purchase order and manufacturing drawings dependent upon the quantity required.
CO7

Hot End
Cooler Carriages
BATH EQUIPMENT

SECTION       C07
EQUIPMENT     OVERHEAD COOLERS
PART NUMBER   ORW/C07/M/2-000/V
PART NAME     HOT END COOLER CARRIAGES

TECHNICAL DESCRIPTION

Orwell can manufacture and supply hot end overhead cooler carriages and support steelwork for new builds and cold repairs. This equipment is sited in Bays 1 & 2 on both sides of the bath.

COMPONENT VARIABLES

There are several variants on the design of hot end cooler carriages and the supporting steelwork. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can offer their own in-house design of these cooler carriages and supporting steelwork. Technical discussions would also be required to co-ordinate the design with the customer’s bath supporting steelwork design.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

There are generally no spares associated with hot end carriages or the support steelwork, manufacturing and delivery time would be agreed with the customer.
CO7
Narrow End
Cooler Carriages
BATH EQUIPMENT

SECTION  C07
EQUIPMENT  OVERHEAD COOLERS
PART NUMBER  ORW/C07/M/3-000/V
PART NAME  NARROW END COOLER CARRIAGES

Carriage and Control Panel

TECHNICAL DESCRIPTION
Orwell can manufacture and supply narrow end overhead cooler carriages and support steelwork for new builds and cold repairs. This equipment is located in the exit end bays of the bath.

COMPONENT VARIABLES
There can be several variants on the design of narrow end cooler carriages and the supporting steelwork. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can offer their own in-house design of these cooler carriages and supporting steelwork. Technical discussions would also be required to co-ordinate the design with the customer’s bath supporting steelwork design and location of the carriages.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
TECHNICAL DESCRIPTION

The gearbox forms part of the drive arrangement to the carriage. The gearbox is a ‘Renold’ WM 5 shaft mounted box.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

The gearbox is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 6 weeks or earlier.
TECHNICAL DESCRIPTION
The coupling forms part of the drive arrangement to the carriage. The coupling is a ‘Renold’ Hydrastart soft start coupling type HS4.

COMPONENT VARIABLES
This is a standard component.

ADDITIONAL INFORMATION
The coupling is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 6 weeks or earlier.
BATH EQUIPMENT

SECTION C07
EQUIPMENT OVERHEAD COOLERS
PART NUMBER ORW/C07/M/3-003/S
PART NAME NARROW END CARRIAGE LIMIT SWITCHES

TECHNICAL DESCRIPTION
The limit switches are fitted to brackets attached to the carriage runway beams. The limit switches control the travel of the carriage.

COMPONENT VARIABLES
These are standard components.

ADDITIONAL INFORMATION
The limit switches are not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
CO7
Floor Mounted Cooler Carriages
BATH EQUIPMENT

SECTION C07
EQUIPMENT OVERHEAD COOLERS
PART NUMBER ORW/C07/M/4-000/V
PART NAME FLOOR MOUNTED OVERHEAD COOLER CARRIAGES

TECHNICAL DESCRIPTION

Orwell can manufacture and supply manually operated floor mounted overhead cooler carriages. The carriages are manufactured and supplied in pairs and can be supplied with or without the coolers and special bath side seal depending upon the customer's needs.

COMPONENT VARIABLES

There are several variants on the design of carriages, cooler and side seal. Technical discussions would be necessary and a complete set of the customer’s drawings required for manufacture. Alternatively Orwell can offer their own in-house design of these carriages.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
CO8
Linear Motor Carriages
BATH EQUIPMENT

SECTION C08

EQUIPMENT LINEAR MOTOR CARRIAGES

PART NUMBER ORW/C08/M/1-000/S

PART NAME LINEAR MOTOR CARRIAGES

TECHNICAL DESCRIPTION

Orwell can manufacture and supply linear motors and carriages. This equipment is used as required in any location in the bath as determined by production requirements. The carriages are supplied in pairs, and generally a plant will have available 3 pair of carriages. The carriages will be supplied with linear motor side seals and with control panels to operate the linear motors.

COMPONENT VARIABLES

Orwell can offer their own in-house design of these carriages or we can manufacture to the customer’s drawings. Technical discussions would be required to co-ordinate the design with the customer’s bath house floor level to tin level dimension.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTOR CARRIAGES
PART NUMBER ORW/C08/M/1-001/S
PART NAME FILTER/REGULATOR/LUBRICATOR

TECHNICAL DESCRIPTION

Mounted on the linear motor carriage pneumatic panel, the filter/regulator/lubricator assembly cleans, controls and lubricates the incoming compressed air into the carriage pneumatic system.

COMPONENT VARIABLES

None.

ADDITIONAL INFORMATION

The filter/regulator/lubricator assembly is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTOR CARRIAGES
PART NUMBER ORW/C08/M/1-002/S
PART NAME FLOW CONTROL REGULATOR

TECHNICAL DESCRIPTION
The flow control regulator is mounted into the pneumatic panel to control the air flow to the pneumatic cylinder.

COMPONENT VARIABLES
None.

ADDITIONAL INFORMATION
The flow control regulator is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTOR CARRIAGES
PART NUMBER ORW/C08/M/1-003/S
PART NAME PNEUMATIC CYLINDER

TECHNICAL DESCRIPTION
The pneumatic cylinder operates the carriage emergency raise mechanism which quickly raises the linear motor clear of the tin in the event of an emergency.

COMPONENT VARIABLES
None.

ADDITIONAL INFORMATION
The pneumatic cylinder is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 6 weeks or earlier.
CO8
Linear Motors
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTORS
PART NUMBER ORW/C08/M/2-001/S
PART NAME 12 POLE LINEAR MOTOR

TECHNICAL DESCRIPTION
Linear motors are used in the bath to help give some control of the temperature profile across the ribbon width. This is achieved by controlling tin flows within the bath, the motors operate on the principle of generating a magnetic field which as tin is a conductor will cause a pulling or pushing effect on the surface of the tin thus creating flows within the tin. The linear motors for general bath use are mounted on carriages and are generally operated in pairs either side of the bath. Orwell can supply 12 pole linear motors which we source from a long established linear motor manufacturer (R. Baker Electrical). All motors are fully tested prior to despatch.

COMPONENT VARIABLES
These are standard components.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTORS
PART NUMBER ORW/C08/M/2-002/S
PART NAME 6 POLE LINEAR MOTOR

TECHNICAL DESCRIPTION
Linear motors are used in the bath to help give some control of the temperature profile across the ribbon width. This is achieved by controlling tin flows within the bath, the motors operate on the principle of generating a magnetic field which as tin is a conductor will cause a pulling or pushing effect on the surface of the tin thus creating flows within the tin. The linear motors for general bath use are mounted on carriages and are generally operated in pairs either side of the bath. Orwell can supply 6 pole linear motors which we source from a long established linear motor manufacturer (R. Baker Electrical). All motors are fully tested prior to despatch.

COMPONENT VARIABLES
These are standard components.

ADDITIONAL INFORMATION
Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
BATH EQUIPMENT

SECTION C08
EQUIPMENT LINEAR MOTORS
PART NUMBER ORW/C08/M/2-003/S
PART NAME 6 POLE DE DROSSING LINEAR MOTOR

TECHNICAL DESCRIPTION
Linear motors can also be used in the de drossing pockets of the bath to help maintain clean tin in the bath by removing “dross” floating on the tin surface. The linear motor pulls tin from the exit lip area into the de drossing pocket where the dross is held in the pocket by a weir allowing it to be removed when required. The linear motors for modern day de drossing pockets are straight 6 pole motors which sit on the pocket refractory sides and are supported by a simple stand from the bath floor. Orwell can supply de drossing linear motors which we source from a long established linear motor manufacturer (R. Baker Electrical). All motors are fully tested prior to despatch.

COMPONENT VARIABLES
These are standard components.

ADDITIONAL INFORMATION
As these motors are not mounted on a linear motor carriage a separate stand alone flow alarm control panel and transformer are initially supplied with these de drossing linear motors along with a support stand.
BATH EQUIPMENT

SECTION     C08
EQUIPMENT   LINEAR MOTORS
PART NUMBER  ORW/C08/M/2-004/S
PART NAME   6 POLE DE DROSSING LINEAR MOTOR
             ‘T’ SHAPED DESIGN

TECHNICAL DESCRIPTION

Linear motors can also be used in the de drossing pockets of the bath to help maintain clean tin in the bath by removing “dross” floating on the tin surface. The linear motor pulls tin from the exit lip area into the de drossing pocket where the dross is held in the pocket by a weir allowing it to be removed when required. The linear motors for older de drossing pockets are ‘T’ shaped 6 pole motors which sit on the pocket refractory sides and are supported by a simple stand from the bath floor. Orwell can supply de drossing linear motors which we source from a long established linear motor manufacturer (R. Baker Electrical). All motors are fully tested prior to despatch.

COMPONENT VARIABLES

These are standard components.

ADDITIONAL INFORMATION
C15
Coating Equipment
## TECHNICAL DESCRIPTION
Orwell can manufacture and supply a coater beams, coater carriages, steelwork, side seals, ancillary components and control panels to customers manufacturing drawings.

## COMPONENT VARIABLES
There may be variants on coating equipment, technical discussions will be necessary and a full set of manufacturing drawings from the customer.

## ADDITIONAL INFORMATION
Technical discussions if required can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
C21

Complete Electrical & Mechanical Top Roll Machine Package
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-000/V
PART NAME TOP ROLL MACHINES

COMPLETE TOP ROLL MACHINES
WITH CONTROL PANELS

TECHNICAL DESCRIPTION

Orwell can manufacture top roll machines including machine wiring and control panels to customer’s design drawings. The package will include full functional testing of the machines with the control panels in our workshops at inspection. Alternatively Orwell can offer their own in-house design of top roll machines and control panels.

COMPONENT VARIABLES

There are many variants of top roll machines. Technical discussions would therefore be necessary to agree the machine specification.

ADDITIONAL INFORMATION

Technical discussions can be carried out at the Orwell offices in the UK, or our technical directors will travel to you. Orwell can if so required by the customer just manufacture and wire the machines and exclude the control panel from the scope of supply.
TECHNICAL DESCRIPTION

The barrel knurl assembly is a water cooled assembly that is a driven part of the top roll machine that enters the bath and engages the ribbon in order to control and set ribbon width and substance thickness. The barrel (50mm nominal diameter) is machined from a specific grade of cold drawn seamless tube which is normalised and finished to a finish of 1.2 microns. The knurl is a one piece toothed wheel (120 teeth) fabricated and machined from mild steel which is a tolerance fit on one end of the barrel, the two components are then fully seal welded together. Material and welding is critical to the good and correct manufacture of a barrel / knurl assembly. The finished assembly is helium leak tested and then hydraulically pressure tested to 6.5 bar. The concentricity of the finished assembly is also critical for good glass manufacture.

COMPONENT VARIABLES

The customer is required to provide drawings of the barrel and knurl detail, as barrels may vary slightly in design and knurls can vary in diameter and also in tooth thickness and rows of teeth.

ADDITIONAL INFORMATION

As it is generally only the knurl that requires replacing it is possible to grind off old knurls and re-use the old barrel with a new knurl, however the new assembly cannot be successfully helium tested due to water traces in the re-used barrel. A complete new assembly is therefore considered the best, safest and subsequently cost effective method of knurl replacement.

Some plants also prefer to purchase barrels and knurls separately and carry out the welding and testing of the final assembly themselves.
THE TECHNICAL DESCRIPTION

The barrel is a water cooled tube onto which the knurl head is welded to, the barrel provides a return chamber for cooling water that is used to cool the knurl. The assembled unit when fitted onto the top roll machine and operated engages the glass ribbon in the bath and controls and sets ribbon width and substance. The barrel is machined from a specific grade of cold drawn seamless tube which is normalised and finished to a finish of 1.2 microns and has a strict eccentricity tolerance.

COMPONENT VARIABLES

The customer is required to provide a detail drawing of the barrel, as barrels may vary slightly in design.

ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-003/V
PART NAME KNURL

TECHNICAL DESCRIPTION
The knurl is a one piece toothed wheel (120 teeth) fabricated and machined from mild steel to become a tolerance fit onto the top roll barrel prior to being fully welded to the barrel. The knurl is the component on the top roll machine that is “nipped” onto the glass ribbon to control the ribbon width and substance thickness. Knurls are manufactured to a strict concentricity tolerance. Each knurl when supplied as an individual unit is helium leak tested.

COMPONENT VARIABLES
The customer is required to provide a detail drawing of the knurl, as knurls may vary slightly in diameter, tooth thickness and rows of teeth.

ADDITIONAL INFORMATION
None
### TECHNICAL DESCRIPTION

The quill is a length of heat resisting steel tube grade 321S20 which provides a passageway of water supply from the top roll machine rotary union to the knurl head. One end of the quill locates into the knurl head whilst the other end has a ½” BSP thread to enable it to screw into the rotary union.

### COMPONENT VARIABLES

The customer is required to provide a detail drawing of the quill, as quills may vary slightly in design.

### ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-005/V
PART NAME WATER COOLED BARREL HOUSING

TECHNICAL DESCRIPTION

The top roll machine water cooled jacket which houses the knurl barrel assembly. The barrel housing sits inside the bath through a special top roll side seal. The barrel housing is a precision fabricated and machined mild steel component which on completion of manufacture is helium leak tested and then hydraulically pressure tested to 6.5 bar.

Some general dimensions:

Housing length = 3484mm.
Housing outside diameter = 152.4mm.
End flange diameter = 190mm.

COMPONENT VARIABLES

The customer is required to provide a detail drawing of the barrel housing, as housings may vary slightly in design.

ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION C21

EQUIPMENT TOP ROLL MACHINES

PART NUMBER ORW/C21/M/1-006/S

PART NAME BARREL HOUSING GRAPHITE BUSH

TECHNICAL DESCRIPTION

A hard wearing machined graphite bush that is a tolerance fit into the end boss of the barrel housing. The bore of the bush is a tolerance diameter to provide a running fit to allow the top roll barrel to rotate in the bore. The bush is held secure by a modified M6 capscrew screwed through the end boss of the barrel housing and locating into a 5mm wide slot in the bush.

Material – Graphite grade CY9.

Bush outside diameter = 70.018/69.988mm with 1mm x 45° chamfer on all outer edges.

Bush inside diameter = 50.500/50.539mm with 3mm x 45° chamfer on slotted end.

Overall length = 65mm.

One 5mm wide slot x 12mm long in one end (radiussed).

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

None
## TECHNICAL DESCRIPTION

The sight flow indicator is mounted on the barrel housing return cooling water pipework. It provides a visual indication that cooling water is flowing through the barrel housing.

## COMPONENT VARIABLES

This is a standard component. “Rhodes” sight flow indicator type 400 with 1” BSP female connections.

## ADDITIONAL INFORMATION

None
**TECHNICAL DESCRIPTION**

The “Filton” rotary union is a self contained and self supporting rotary seal that transfers cooling water to and from the top roll machine barrel. Rotary Union type RE – cat No. ST 14379. The union is a stationary centre tube feed ½” BSP (for quill) with the water return through the top roll barrel and union annulus. The union is a steel and iron construction.

**COMPONENT VARIABLES**

This is a standard component.

**ADDITIONAL INFORMATION**

None
**BATH EQUIPMENT**

**SECTION**  
C21

**EQUIPMENT**  
TOP ROLL MACHINES

**PART NUMBER**  
ORW/C21/M/1-009/V

**PART NAME**  
LEADSCREW

Section of Leadscrew

**TECHNICAL DESCRIPTION**

The Leadscrew provides the means of traversing the top roll machine carriage back and forth along the top roll main frame. The Leadscrew is driven by means of a belt pulley fitted at the rear of the machine and powered by the knurl traverse motor.

The Leadscrew is machined from mild steel and will vary in design and size depending upon the model of the top roll machine.

**COMPONENT VARIABLES**

The customer is required to provide a detail drawing of the Leadscrew as they can vary slightly depending on the model of the top roll machine.

**ADDITIONAL INFORMATION**

None
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-010/V
PART NAME LEADSCREW NUT

TECHNICAL DESCRIPTION
The Leadscrew Nut facilitates the drive connection between the top roll machine carriage and the Leadscrew drive on the main frame.

The Nut is a split type design manufactured from phosphor bronze and its size will vary depending upon the top roll machine model and Leadscrew size.

COMPONENT VARIABLES
The customer is required to provide a detail drawing of the Nut as Leadscrew Nuts can vary slightly in design.

ADDITIONAL INFORMATION
None
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### TECHNICAL DESCRIPTION

The Dynapar encoder measures the linear speed of the barrel and knurl, driven by the main motor P1.

### COMPONENT VARIABLES

None

### ADDITIONAL INFORMATION

None
# BATH EQUIPMENT

## SECTION
C21

## EQUIPMENT
TOP ROLL MACHINES

## PART NUMBER
ORW/C21/E/1-012/V

## PART NAME
MAIN DRIVE MOTOR / GEARBOX (SERVICE PACKAGE)

---

### TECHNICAL DESCRIPTION

The Siemans synchronous motor and Opperman gearbox unit for driving the knurl. These units are difficult to source and are a very long lead and expensive item from new. Orwell can offer a service exchange package whereby a completely overhauled motor and gearbox can be shipped out to the customer in exchange for the customer’s old unit.

### COMPONENT VARIABLES

The customer is required to provide the full specification of the motor and gearbox to ensure complete compatibility with the overhauled unit being offered.

### ADDITIONAL INFORMATION

None
BATH EQUIPMENT

SECTION       C21
EQUIPMENT     TOP ROLL MACHINES
PART NUMBER   ORW/C21/E/1-013/V
PART NAME     LIMIT SWITCHES

Type 1LS1-4C

TECHNICAL DESCRIPTION

There are two types of “Honeywell” limit switches used on the top roll machines Honeywell type 1LS1-4C (used on the machine handwheels) illustrated above, and Honeywell type BZE9-2RQ8-PG a special limit switch (used on the nip). Both of these limit switches are available as a stock spare from Orwell.

COMPONENT VARIABLES

The customer is required to identify the function of the limit switch required.

ADDITIONAL INFORMATION

None
TECHNICAL DESCRIPTION

The gearbox is attached to the rear of the water cooled barrel housing and transmits drive from the main drive motor to the barrel and knurl assembly.

COMPONENT VARIABLES

None

ADDITIONAL INFORMATION

The Dynapar encoder is attached to the gearbox and can be purchased separately.
BATH EQUIPMENT

SECTION        C21
EQUIPMENT      TOP ROLL MACHINES
PART NUMBER    ORW/C21/M/1-015/S
PART NAME      TOP ROLL MACHINE HANDWHEEL SPRING

TECHNICAL DESCRIPTION
The Top Roll Handwheel Spring keeps the handwheel disengaged from the clutch drive when the leadscrew is driven under power.

COMPONENT VARIABLES
None

ADDITIONAL INFORMATION
None.
TECHNICAL DESCRIPTION

The Lead Screw Spring is located at each end of the Lead Screw to prevent the main carriage disengaging from the Lead Screw.

COMPONENT VARIABLES

None

ADDITIONAL INFORMATION

None.
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-017/S
PART NAME FILTER/REGULATOR/LUBRICATOR

TECHNICAL DESCRIPTION
Mounted in the top roll machine pneumatic control box the filter/regulator/lubricator unit cleans, controls and lubricates the compressed air supply to the pneumatic system.

COMPONENT VARIABLES
None

ADDITIONAL INFORMATION
The filter/regulator/lubricator assembly is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-018/S
PART NAME AIR MOTOR

TECHNICAL DESCRIPTION
The air motor operates the nip raise/nip lower drive to the knurl head.
The motor is a “Gast” 8 vane reversible motor reference 1UP-NRV-11-GR11 and comes with ¼” NPT air connection ports.

COMPONENT VARIABLES
None.

ADDITIONAL INFORMATION
The air motor is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 6 weeks or earlier.
BATH EQUIPMENT

SECTION    C21
EQUIPMENT  TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-019/S
PART NAME  PNEUMATIC CYLINDER

TECHNICAL DESCRIPTION
The pneumatic cylinder operates the emergency nip raise for the knurl head.

The cylinder is a “Compair Maxam” cylinder reference P1D-S100MS-50 and comes with a rear clevis mounting bracket reference P1C4QMT.

COMPONENT VARIABLES
None.

ADDITIONAL INFORMATION
Replacement cylinders can just be provided without the clevis mounting bracket. The cylinders are not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
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### TECHNICAL DESCRIPTION

The screw jack operates the knurl raise/lower mechanism on the top roll machine.

The screw jack is a “Power Jacks” jack reference 1802 upright jack with a 75mm stroke and 14:1 gearing ratio and comes with a clevis screw end connection.

### COMPONENT VARIABLES

### ADDITIONAL INFORMATION

The screw jack is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 8 weeks or earlier.
TECHNICAL DESCRIPTION
The spider coupling forms the mechanical connection between the screw jack and the nip adjust hand wheel shaft on the top roll machine.

The spider coupling is a “Renold” spider coupling with the bore machined to suit the keyway on the nip adjust shaft.

COMPONENT VARIABLES
None.

ADDITIONAL INFORMATION
The spider coupling is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 5 weeks or earlier.
TECHNICAL DESCRIPTION

The bevel gears form the mechanical drive connections between the air motor and the screw jack and manual override shaft, and they are also used to form the manual connection between the lead screw and the front hand wheel shaft.

All the bevel gears have the same gearing and tooth profile but the bore of the bevel gears differ depending upon which particular bevel gear is required.

COMPONENT VARIABLES

The bore details of the bevel gear varies depending upon its location on the top roll machine, the customer should identify which particular bevel gear is required.

ADDITIONAL INFORMATION

The bevel gears should not require replacing during a glassmaking campaign unless they have been damaged by external forces. At a cold repair the gear teeth should be inspected for excess wear and damage and replaced as necessary.

The gears are not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-023/V
PART NAME SOLENOID VALVE

TECHNICAL DESCRIPTION
There are two different solenoid valves on the top roll machines. One valve mounted into the pneumatic panel operates the pneumatic cylinder and one valve mounted onto the underside of the upper manifold operates the air motor.

COMPONENT VARIABLES
The customer should identify which particular solenoid valve is required and should confirm the instrumentation voltage that the valve is to be operated on.

ADDITIONAL INFORMATION
The solenoid valve is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION  C21
EQUIPMENT  TOP ROLL MACHINES
PART NUMBER  ORW/C21/M/1-024/V
PART NAME  FLOW CONTROL VALVE

TECHNICAL DESCRIPTION
There are four flow control valves on the top roll machines of two different sizes. There are two flow control valves mounted into the pneumatic panel which control the air flow to the pneumatic cylinder and there are two flow control valves assembled to the solenoid control valve for the air motor.

COMPONENT VARIABLES
The customer should identify which particular flow control valve is required when ordering. The flow control valves for the pneumatic cylinder are reference S837 (½” port size) and the flow control valves for the air motor are reference M839 (¼” port size).

ADDITIONAL INFORMATION
The flow control valve is not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier.
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/1-025/S
PART NAME CHECK UNIT & ADAPTOR

TECHNICAL DESCRIPTION

The check units and adaptors facilitate the connection and quick release of the top roll machine to the compressed air pipeline at the bath side. The female check unit part is screwed to the compressed air stub pipe connection at the bath side whilst the adaptor is fitted to the flexible compressed air hose attached to the top roll machine. Together the two parts allow for a quick and safe installation / removal of the machine to the main compressed air supply.

COMPONENT VARIABLES

None

ADDITIONAL INFORMATION

The check units are not a standard stock spare item held by Orwell, but Orwell can generally have one available within 4 weeks or earlier. These items are also used on Motorised Positioner Units and Linear Motor Carriages.
TECHNICAL DESCRIPTION

The top roll bellows side seal assembly is the complete unit sealing the top roll water cooled barrel housing to the bath side.

The complete unit comprises of the side seal box, bellows assembly, carbons and sealing plate.

COMPONENT VARIABLES

There are different side seal box dimensions to suit different bath designs. A complete set of manufacturing drawings should be provided by the customer.

ADDITIONAL INFORMATION

Technical discussions if required can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.
TECHNICAL DESCRIPTION

The Top Roll Bellows facilitates a flexible sealed connection between the top roll machine barrel housing and the top roll side seal, whilst allowing the top roll machine to be capable of travelling through the full range of its slew parameters. The Bellows is manufactured from stainless steel grade S527 or EN58B.

Standard bellows sizes -

Bellows type 'A'

Overall length = 381mm.

Outside diameter over convolutions = 272.5.

Inside diameter at cuffs = 238mm.

Number of convolutions = 54 (reference).

Length over convolutions = 343 (reference).

Material thickness = 0.0075/0.0085 inches (0.1905/0.2159mm).

COMPONENT VARIABLES

The customer is required to provide a drawing of the Bellows to ensure compatibility with the top roll machine.

ADDITIONAL INFORMATION

Due to the environment in which they operate the Bellows will over time become brittle and splits may occur, this will cause oxygen ingress into the bath. The Bellows should be replaced when damaged to avoid glassmaking problems.
BATH EQUIPMENT

SECTION C21
EQUIPMENT TOP ROLL MACHINES
PART NUMBER ORW/C21/M/2-002/S
PART NAME SIDE SEAL BELLOWS GRAPHITE BUSH

TECHNICAL DESCRIPTION

There are four (4) Graphite Bearings fitted into each Top Roll Bellows on assembly with the top roll machine. The bearings help form a seal around the top roll bearing water cooled bearing housing body and the bellows.

The bearing is machined from graphite CS grade.

Outside diameter = 172.855mm/172.696mm.

Inside diameter = 152.6mm/152.7mm.

Overall length = 50mm.

2mm x 45° chamfers on all edges.

COMPONENT VARIABLES

This is a standard component.

ADDITIONAL INFORMATION

None.
# BATH EQUIPMENT

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## TECHNICAL DESCRIPTION

The tadpole seal is used to form an air tight seal between the top roll side seal front plate and the bellows adaptor mounting plate. The tadpole seal is attached by a series of screws through its tail to the front plate of the top roll side seal section.

Seal specification :-
- Fibreglass cloth with wire mesh bulb.
- Bulb diameter = 25mm.
- Seal tail length = 25mm.

## COMPONENT VARIABLES

This is a standard component for the top roll machine side seals.

## ADDITIONAL INFORMATION

This material is used on other items of equipment but the bulb diameter and tail length may be different, customer to specify if ordering for other equipment.
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH PERISCOPES
PART NUMBER ORW/C35/M/1-000/V
PART NAME BATH PERISCOPE SYSTEM

TECHNICAL DESCRIPTION
The complete bath periscope system is available and comprises of all the hanging brackets, carriage, tracks, water cooled jacket, 'Introvision' optical tube, camera and bath roof sealing plug.

COMPONENT VARIABLES
There are water jacket length and camera variations as well as a manual or motorised operation design.

ADDITIONAL INFORMATION
Technical discussions if required can be carried out at the Orwell offices in the UK, or our technical directors will travel to you. Viewing monitors for the control room and if required local to the periscopes at the bath side are not included in the Orwell supply.
TECHNICAL DESCRIPTION

The periscope water jacket provides the housing and cooling protection for the periscope optical tube for insertion into the bath. The water jacket is a precision fabricated and machined component adhering to strict welding procedures, which on completion of manufacture is helium leak tested and the hydraulically pressure tested to 6.5 bar.

Material – Water jacket housing – heat resisting steel grade 321S31

Manifold housing – mild steel

Overall length of water jacket = this is a variable dimension depending upon the optical tube length.

Water jacket body outside diameter = 4” (102.6mm)

Manifold housing outside diameter = 152mm

COMPONENT VARIABLES

The customer is required to provide a detail drawing of the water jacket, as jackets do vary slightly in design.

ADDITIONAL INFORMATION

Orwell will trial fit an optical tube in the water jacket housing on completion of manufacture.
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH PERISCOPEs
PART NUMBER ORW/C35/M/1-002/S
PART NAME PERISCOPE BATH SEALING SILICONE SEAL

TECHNICAL DESCRIPTION
This seal is used to seal around the periscope water jacket and the bath roof casing when the periscope is inserted into the bath.

A moulded cylindrical silicone rubber seal with a carbon bush insert.

Seal diameter = 179mm & 140mm
Bore diameter = 146mm & 102mm
Overall length = 143mm

Carbon bush insert material CS grade or HLM grade graphite.

COMPONENT VARIABLES
This is a standard component.

ADDITIONAL INFORMATION
The physical dimensions of the seal may vary slightly due to shrinkage over a long period of time. This is normal.
TECHNICAL DESCRIPTION
This seal is used to seal the end of the periscope jacket after insertion of the optical tube to help prevent ingress of oxygen into the jacket.

A moulded cylindrical silicone rubber seal.
Seal diameter = 124mm
Bore diameter = 47mm
Spigot diameter = 85mm
Overall thickness = 27mm
Flange thickness = 17mm

COMPONENT VARIABLES
This is a standard component.

ADDITIONAL INFORMATION
The physical dimensions of the seal may vary slightly due to shrinkage over a long period of time. This is normal.
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH PERISCOPEGES
PART NUMBER ORW/C35/M/1-004/S
PART NAME FLOW INDICATOR

TECHNICAL DESCRIPTION
The sight flow indicator is mounted to the top of the periscope carriage on the CCCW return pipework. It provides a visual indication that cooling water is flowing through the periscope. There is one indicator on every periscope carriage.

COMPONENT VARIABLES
This is a standard component. “Rhodes” sight flow indicator type 400 with 1” BSP connections.

ADDITIONAL INFORMATION
None
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH PERISCOPE
PART NUMBER ORW/C35/M/1-005/V
PART NAME OPTICAL TUBE (INTROVISION)

TECHNICAL DESCRIPTION
The periscope optical tube is manufactured from heat resisting steel and optically set up by Introvision Ltd UK. As the optical tube can have a long delivery period Orwell will hold as a stock item a small quantity of tubes for immediate delivery, complete with any locating collars, 'C' mounts and clamping rings that accompany the tube.

COMPONENT VARIABLES
The customer is required to provide the tube length, the camera mounting details and the camera make, type and specification for which the tube is to be used with. The detail drawing of the tube from the periscope drawing package should also be provided by the customer.

ADDITIONAL INFORMATION
None
TECHNICAL DESCRIPTION

A heat absorbing filter glass that fits in a slot at the front of the camera water box to protect the camera lens from the heat. Filter type HA3

COMPONENT VARIABLES

This is a standard component size 50 x 50 x 3 mm.

ADDITIONAL INFORMATION

These filters are only used on older style periscopes that require a water cooled box for the periscope camera.
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH PERISCOPEGES
PART NUMBER ORW/C35/M/1-007/S
PART NAME NITROGEN PURGE HOSE

TECHNICAL DESCRIPTION

The Nitrogen Purge hose delivers the nitrogen to the introvision tube prism to prevent condensation.

COMPONENT VARIABLES

None

ADDITIONAL INFORMATION

None
C35
Bath Optical Substance Gauge
BATH EQUIPMENT

SECTION     C35
EQUIPMENT   OPTICAL SUBSTANCE GAUGE
PART NUMBER  ORW/C35/M/2-000/V
PART NAME   OPTICAL SUBSTANCE GAUGE

TECHNICAL DESCRIPTION

Orwell can manufacture and supply a complete bath optical substance gauge including the instrumentation box to the customer's design drawings and specifications.

COMPONENT VARIABLES

There may be variants on the substance gauge design (particularly the electronics box). Technical discussions will be necessary and a full set of manufacturing drawings from the customer.

ADDITIONAL INFORMATION

Technical discussions if required can be carried out at the Orwell offices in the UK, or our technical directors will travel to you.

Orwell only manufacture and supply the substance gauge, all setting up and programming of the equipment is the customer’s responsibility.
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH SUBSTANCE GAUGE
PART NUMBER ORW/C35/M/2-001/S
PART NAME RECEIVER (EMITTER) TUBE

TECHNICAL DESCRIPTION
The substance gauge tubes provide a water cooled housing that is inserted into the bath in order to measure the glass thickness. The water jacket is a precision fabricated and machined component adhering to strict welding procedures, which is helium leak tested at various stages of manufacture and on completion is helium tested and then hydraulically pressure tested to 6.5 bar.

Manifold housing – mild steel.

Overall length = 2078mm.
Water jacket body outside diameter = 4¼ inches (107.95mm).
Manifold housing outside diameter (largest diameter) = 152mm.

COMPONENT VARIABLES
This is a standard component, however the tubes are handed, should the customer only require one of the tubes they must specify whether it is the receiver or emitter tube. In such cases the detail drawing will be required to avoid misinterpretation.

ADDITIONAL INFORMATION
None
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH SUBSTANCE GAUGE
PART NUMBER ORW/C35/M/2-002/S
PART NAME SUBSTANCE GAUGE BATH SEALING SILICONE SEAL

TECHNICAL DESCRIPTION
This seal is used to seal around the substance gauge receiver and emitter water jackets and the aperture in the bath side seal when the substance gauge is inserted into the bath.

A moulded tapered cylindrical silicone rubber seal.

Seal diameter = 176mm & 130mm
Bore diameter = 158mm & 112mm
Overall length = 160mm

COMPONENT VARIABLES
This is a standard component.

ADDITIONAL INFORMATION
The physical dimensions of the seal may vary slightly due to shrinkage over a long period of time. This is normal.
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### TECHNICAL DESCRIPTION

The Comar equipment is used on the substance gauge to optimise the image.

### COMPONENT VARIABLES

There are many Comar units used on the optical substance gauge. The unit will need to be identified.

### ADDITIONAL INFORMATION

Orwell Solutions can identify the component from a picture, drawing or part number.

Some older substance gauges may have Comar components which are now obsolete. Orwell can advise on what is the best replacement component and on any design changes required to facilitate the new component.
C35
Bath Camera Systems
BATH EQUIPMENT

SECTION C35
EQUIPMENT BATH TV CAMERA SYSTEM
PART NUMBER ORW/C35/M/4-000/V
PART NAME BATH CAMERA BOXES

TECHNICAL DESCRIPTION

The system comprises of cameras housed in water cooled boxes supported on a simple steel structure mounted to the outside of the bath roof casing. The cameras view the inside of the bath through an atmosphere cooled window. The cameras are generally located at the hot end of the bath, the shoulder section of the bath and between the dross box and lehr (both sides of the bath).

The boxes are fabricated from mild steel plate to suit the camera to be used and the finished camera box water chamber is pressure tested to 4.5 bar.

The internal surfaces of the camera box are painted heat resisting matt black and the outside is painted silver.

COMPONENT VARIABLES

There are many differing camera box designs and sizes depending upon the location to be used in the bath and on the camera to be used.

ADDITIONAL INFORMATION

If required Orwell can also supply the camera for the box to the customer’s specification.
TECHNICAL DESCRIPTION
A piece of toughed float glass fitted into the slot at the front of the Bath TV Camera water jacket to protect the camera lens from the heat. This is fitted to the hot end and shoulder bath camera boxes.

COMPONENT VARIABLES
This is a standard component size 80 x 80 x 6mm.

ADDITIONAL INFORMATION
UNLISTED ITEMS
Fax/email request

If the item you require is not listed in this catalogue, please complete this form and fax/email it to Orwell Engineering Solutions. Orwell will supply the item and add it to the catalogue so you can purchase it in the future from stock.

From: ……………………………………………………………………………………………
Company: …………………………………………………………………………………
Address: …………………………………………………………………………………
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Contact tel: …………………………………………………………………………………

Product request

Item name: …………………………………………………………………………………
Drawing Number: ………………………………………………………………………
Description/specification of item:
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Please fax this form to Mr Chris Smith, Orwell Engineering Solutions Ltd
Fax: +44 (0) 151 525 3288
Or alternatively email your request to chrissmith@orwell-engineering.co.uk
SPARES ORDER / QUOTATION REQUEST FORM

Fax / email request

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Company: ...........................................................................................................................

Address: ...............................................................................................................................

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Contact tel: ..........................................................................................................................

I would like [a quotation for / to order] the following item(s):

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Delivery method required (i.e. ex works UK or delivery to above address or other)

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Drawing(s) attached with this request (if applicable) - □ YES □ NO

Drawing Numbers - ........................................................................................................

Additional comments –

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Please fax this form to Mr Chris Smith, Orwell Engineering Solutions Ltd

Fax: - ++ 44 (0) 151 525 3288

Or alternatively email your request to chrissmith@orwell-engineering.co.uk
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Liverpool, L30 4XL
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