



Byworth
BOILERS

Steam





"I am writing as a businessman for businessmen"

Dennis Baldwin, 1990, in his book "Soil sterilisation using steam".

Dennis Baldwin, Founder of Byworth Boilers. Dennis used steam to heat his commercial greenhouses where he grew Chrysanthemums.



Our Story

Dennis Baldwin – the customer turned entrepreneur - the essence of our brand and our heritage.

Byworth was founded in 1968 by Dennis Baldwin. Dennis became a well-established chrysanthemum and tomato grower. The entrepreneur ran his own successful business from the young age of 17.

Based on 3 sites around Yorkshire, Dennis used steam boilers to heat his 3 acres of glasshouses.











He came from a long line of engineers and with that inherent talent, he decided to design and install his own heating and boiler systems. Soon after, other horticultural businesses were recognising his flair for producing high-quality steam boilers and the demand for his products rose. With two sons more interested in engineering than growing, Dennis took the

brave decision (aged 42) to make a career change. He sold his successful horticultural company to finance a land investment to set up a factory. This was when Dennis Baldwin & Sons boiler manufacturers were first established; later to be known as Byworth Boilers. They supplied steam boilers, not only to growers but to other industries as well.

Dennis was able to build a product that better suited the needs of his industry. These values remain today as Byworth seek to produce solutions that fit the customer's requirements, never offering a 'one size' fits all. We understand the challenges organisations often face, and our team of experts will work in partnership with you to deliver solutions that better support your individual needs.

Our Customers

Today we serve a diverse range of customers, big and small, in a multitude of industries including:

-  Food
-  Beverage
-  Healthcare
-  Paper and Packaging
-  Pharmaceutical
-  Architecture/M&E/Civil Engineering
-  Petrochemical
-  Animal Feeds & Farming
-  Laundries
-  Textiles



Your Guide

Conventional Steam Boilers

The M-Series Range

These compact boilers are perfect for smaller applications and those who are new to steam. The range includes our space-saving, skid-mounted, all-in-one solution with everything you'll need for a quick and easy installation.

Pages 5 - 8

The Peaksman Range

The Peaksman vertical steam boiler delivers Ultra Low NOx emissions in 125 kg/hr to 1000 kg/hr F&A 100°C steam outputs. In spaces where our market leading M-Series horizontal steam boiler would be impractical, the compact Peaksman

vertical steam boiler is a perfect fit, offering modulating controls as standard alongside automatic TDS and bottom blowdown systems.

Pages 9 - 12

The Yorkshireman Range

With a high degree of reliability, low emissions and high efficiency, the Yorkshireman, three-pass, wet-back boilers are the workhorse of the industry.

The Yorkshireman2, with its patented X-ID tube technology is the preferred choice for the truly energy-conscious.

Pages 13 - 18

Heat Recovery Range

Our waste heat boilers offer enhanced efficiency by producing steam using heat recovered from other processes that would otherwise be wasted.

Pages 19 - 20

Economisers

New and old boilers alike will benefit from reduced fuel consumption by installing one of these two technologies. Heat is recovered from the boiler's own waste gases to heat either the boiler feedwater or combustion air.

Pages 21 - 22

Other Products

You may also need:

Boiler Houses

We offer a range of boiler-housing options from prefabricated, "plug & play" boiler houses, through to full on-site construction of larger buildings.

Pages 23 - 30

Accumulators

Remove the peaks and troughs from your steam demand with a custom-made steam storage vessel.

Pages 35- 36

Hotwells, Deaerators & Blowdown Vessels

Hotwell tanks and deaerators are essential to capture returning condensate, and provide a strategic store of hot, treated water for the boiler. Blowdown vessels provide a safe means of cooling waste water from the boiler before discharging it to drain.

Pages 37 - 40

Unity Boiler House Control System

Byworth's advanced control system offers users smart control for their entire boilerhouse. This unique control system has been recognised with a Queen's Award for Enterprise in Innovation, 2016.

Pages 31 - 34

Burners - Did you know...

...We work with all the leading manufacturers to ensure we offer you the right burner to meet your unique needs.





M-SERIES

Compact horizontal boiler for light to medium steam load.

Sizes: from 250 – 5,000 kg/hr
Working pressure: up to 13.8 bar g

Made exclusively in the UK, the Byworth M-Series is the popular option for small to medium applications. Robust, reliable and designed for long-term ease of maintenance; the M-Series range is the smart choice for those who need a little more steam storage or drier steam than typically offered by vertical solutions.

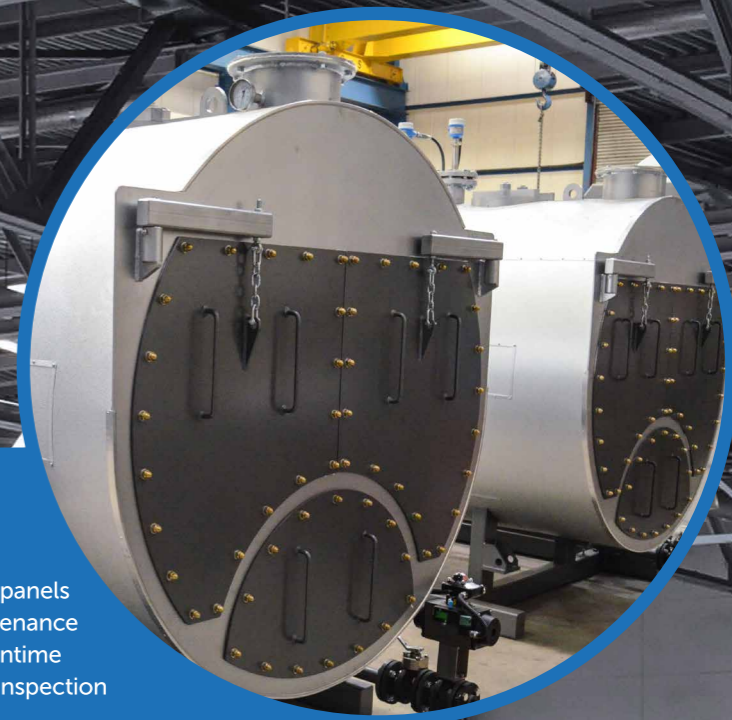
The M-Series is all about getting the basics right so you can focus on delivering your customers' needs.

- The ideal balance between efficiency and size
- Suitable for a wide range of liquid or gaseous fuels including natural gas, LPG, LNG, biogas and heating oils
- Less than 100mg/m³ NO_x when firing on natural gas *
- Less than 200mg/m³ NO_x when burning class A2/D fuel oil to BS 2869 *
- Lightweight, hinged front-door
- Removable rear doors
- Spiral wound turbulators significantly improve efficiency without increasing the boiler footprint
- Available as a compact, skid-mounted option for the those with limited space
- A wide range of upgrades are available including efficiency enhancements and controls for unattended operation

*Applies to boiler range 1500kg and above

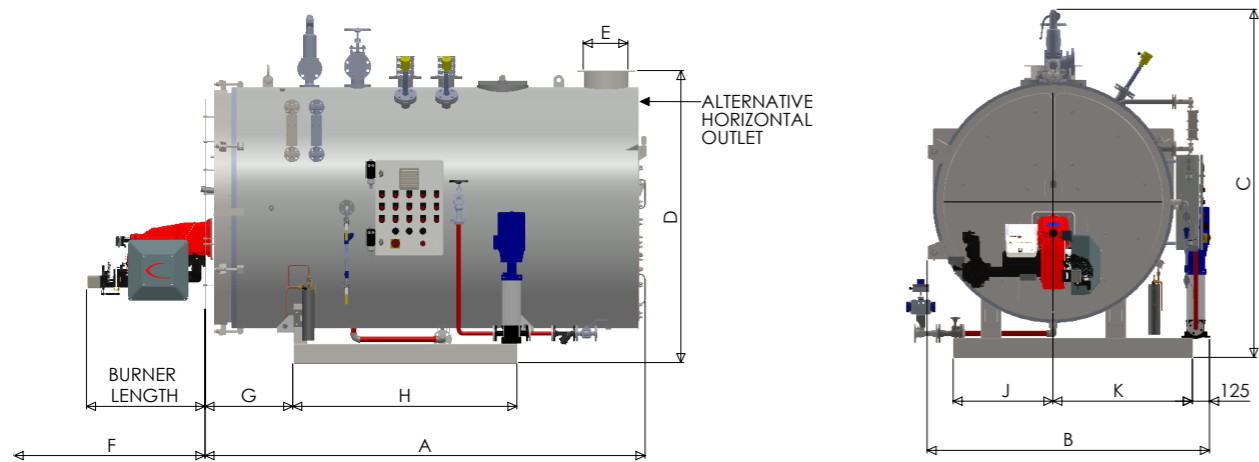
Reduced Downtime

The M-Series has design advantages such as a lightweight, hinged front door, weld inspection panels and removable doors; creating an ease of maintenance for any engineer or inspector. This reduces downtime significantly during cleaning, maintenance and inspection





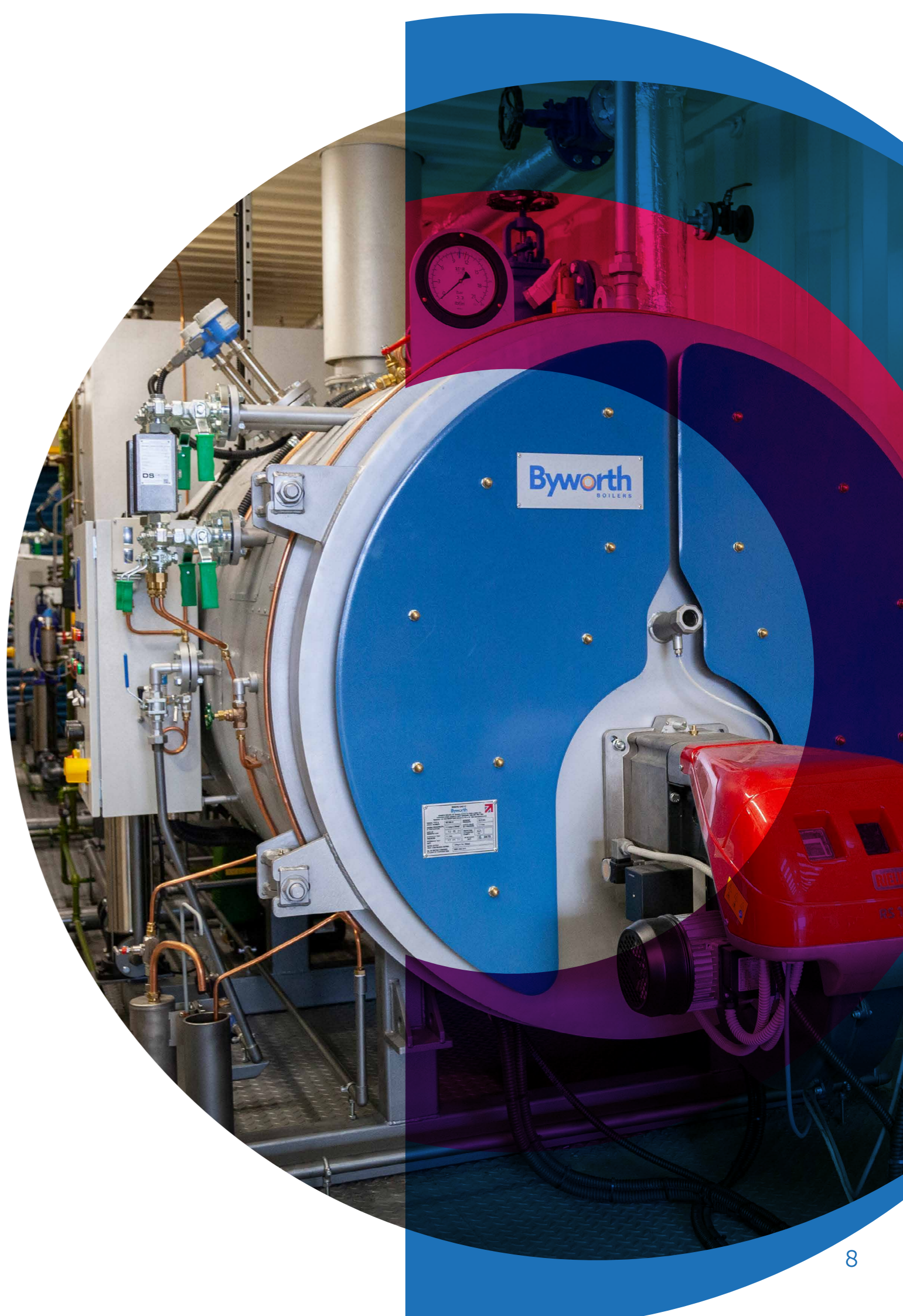
The M-Series Dimensions

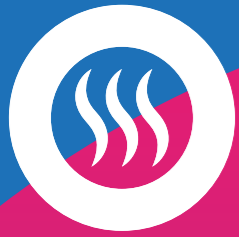


M-SERIES - BOILER DIMENSIONS

| Model MX | 250 | 500 | 1000 | 1360 | 1500LN | 2000LN | 2500LN | 3000LN | 3500LN | 4000LN | 5000LN |
|--------------------------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Duty F & A 100°C | | | | | | | | | | | |
| lb/hr | 500 | 550 | 1000 | 1100 | 1500 | 2000 | 2200 | 2500 | 3000 | 3300 | 4000 |
| hp | 14 | 16 | 29 | 32 | 43 | 58 | 64 | 72 | 87 | 96 | 116 |
| kg/hr | 227 | 250 | 454 | 500 | 681 | 908 | 1000 | 1135 | 1362 | 1500 | 1816 |
| kW | 146 | 160 | 292 | 322 | 438 | 584 | 644 | 730 | 876 | 966 | 1168 |
| Boiler Length | A | 1435 | 1985 | 2105 | 2630 | 2630 | 3110 | 3275 | 3580 | 4105 | 4440 |
| Overall Width | B | 1250 | 1295 | 1625 | 1652 | 1885 | 2030 | 2130 | 2180 | 2310 | 2720 |
| Height to top of safety Valve | C | 1485 | 1750 | 2125 | 2240 | 2350 | 2535 | 2735 | 2850 | 2925 | 3280 |
| Minimum height /chimney height | D | 1340 | 1510 | 1870 | 1930 | 1990 | 2140 | 2340 | 2390 | 2515 | 2870 |
| Chimney Diameter ID | E | 125 | 200 | 225 | 250 | 300 | 350 | 350 | 400 | 450 | 500 |
| Tube Withdrawal Space | F | 800 | 1220 | 1320 | 1800 | 2025 | 2425 | 2550 | 2835 | 2900 | 3010 |
| Base Frame Inset | G | 280 | 450 | 450 | 500 | 500 | 580 | 650 | 650 | 825 | 825 |
| Base Frame Length | H | 1210 | 1400 | 1450 | 1800 | 1800 | 1620 | 1720 | 1930 | 2420 | 2530 |
| Base Frame Width | J | 450 | 510 | 630 | 650 | 700 | 730 | 760 | 760 | 905 | 1010 |
| Base Frame Width | K | 570 | 610 | 820 | 850 | 950 | 1020 | 1070 | 1100 | 1105 | 1140 |
| Steam Outlet | 100psig | 25NB | 40NB | 50NB | 65NB | 65NB | 80NB | 80NB | 100NB | 100NB | 100NB |
| Steam Outlet | 150psig | 25NB | 40NB | 50NB | 65NB | 65NB | 80NB | 80NB | 100NB | 100NB | 100NB |
| Safety Valve Outlet | 100psig | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/2" BSP | 11/2" BSP | 2" BSP | 2" BSP | 21/2" BSP | 21/2" BSP | 21/2" BSP |
| Safety Valve Outlet | 150psig | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/2" BSP | 11/2" BSP | 2" BSP | 2" BSP | 21/2" BSP | 21/2" BSP | 21/2" BSP |
| Water Inlet | 1" BSP | 1" BSP | 1" BSP | 1" BSP | 1" BSP | 1" BSP | 1" BSP | 1" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP |
| Blowdown Outlet | 1" BSP | 1" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP | 11/4" BSP |
| Burner Length* | mm | 536 | 732 | 790 | 790 | 965 | 965 | 965 | 965 | 965 | 1155 |
| Weight Empty | Kg | 1100 | 1465 | 3105 | 3900 | 5100 | 6420 | 7220 | 7860 | 7990 | 8470 |
| Weight Full to NWL | Kg | 1300 | 2030 | 3860 | 5265 | 6950 | 9660 | 10340 | 11575 | 11184 | 11990 |
| Total Heating Surface | m ² | 3.92 | 8.34 | 16.9 | 24.4 | 26.1 | 34.4 | 45.3 | | | |
| Steam Release Area | m ² | 0.57 | 0.98 | 1.59 | 2.03 | 1.99 | 2.8 | 3 | | | |
| Steam Space Volume | m ³ | 0.05 | 0.1 | 0.28 | 0.35 | 0.26 | 0.47 | 0.52 | | | |

* Variable depending upon burner manufacturer
For illustration purposes only design drawings available upon request






PEAKSMAN

A quality Byworth product, made in Britain

Sizes: 125 - 1000 kg/hr
Working pressure: 10.34 bar g (maximum)

With one of the smallest footprints in the industry the Byworth Peaksman boiler is the ideal steam solution for small to medium applications. Robust, reliable and designed for long-term ease of maintenance.

- Designed and manufactured in Britain
- Ultra low NOx (less than 40mg/m³ NOx when firing on Natural Gas)
- Modulating Controls
- 5-year guarantee (against manufacture defects for the vessel)
- Suitable to fire on Natural Gas or LPG
- Horizontally mounted burner for ease of maintenance and to reduce overall height

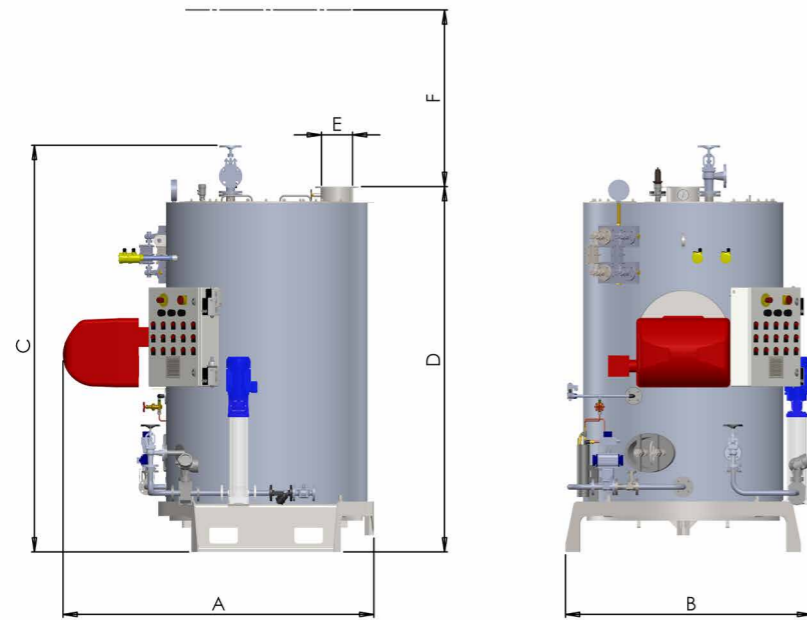


The Peaksman is all about providing the very best quality, British made steam solution within a small footprint.





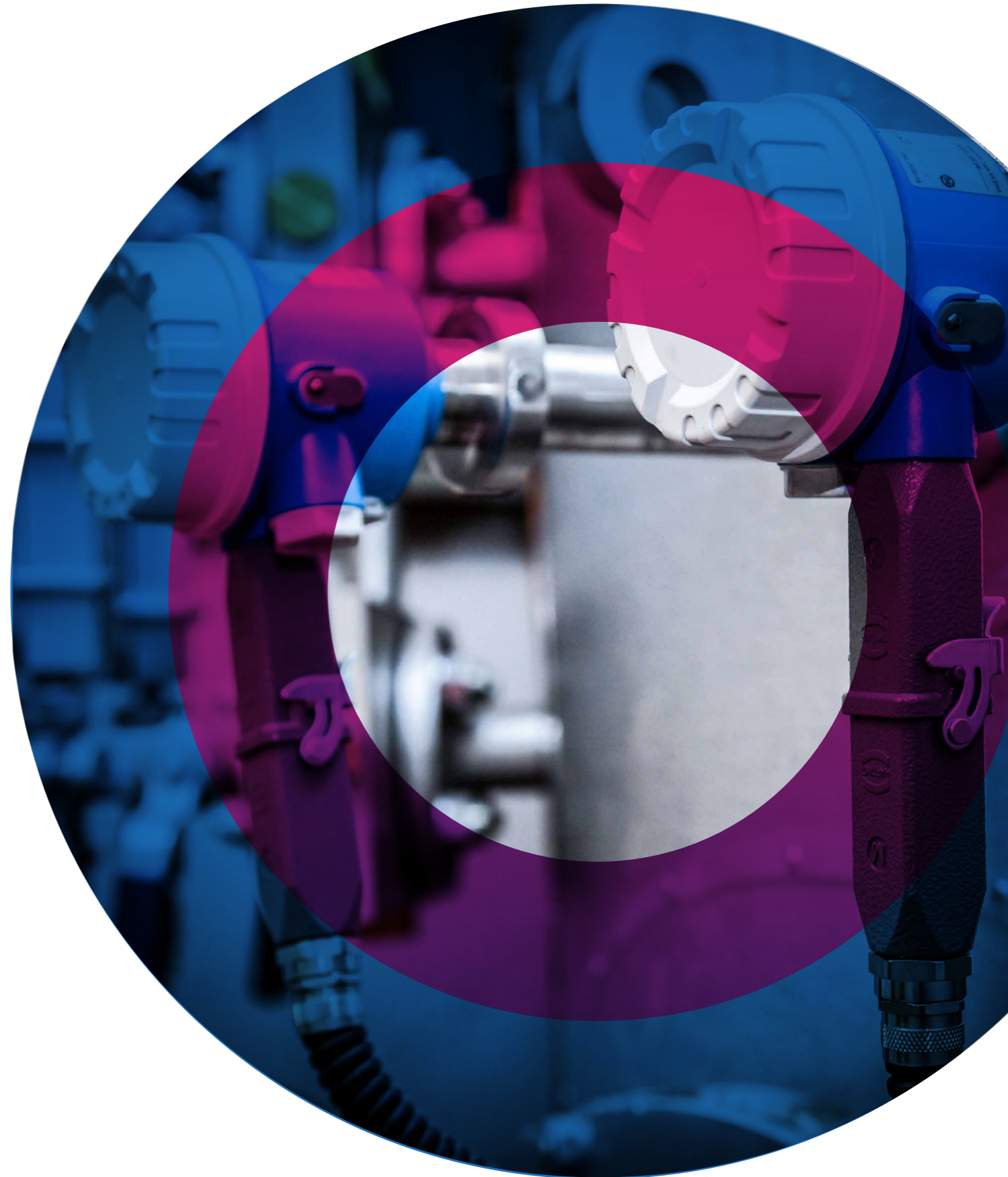
The Peaksman Dimensions



PEAKSMAN VERTICAL SERIES - BOILER DIMENSIONS

| Model PSX | | 125 | 250 | 500 | 750 | 1000 |
|----------------------------------|-------|-------|-----|-------|------|-------|
| Duty F & A 100°C | lb/hr | 275 | 550 | 1100 | 1650 | 2200 |
| | hp | 8 | 16 | 32 | 48 | 64 |
| | kg/hr | 125 | 250 | 500 | 750 | 1000 |
| | kW | 78 | 157 | 313 | 470 | 627 |
| Boiler Depth | A | 1495 | | 1775 | | 2190 |
| Overall Width | B | 1200 | | 1450 | | 1740 |
| Height to top of Crown Valve | C | 2220 | | 2600 | | 2865 |
| Minimum height /chimney height | D | 1980 | | 2350 | | 2575 |
| Chimney Diameter ID | E | 125 | | 150 | | 225 |
| Tube Withdrawal Space | F | 1150 | | 1520 | | 1750 |
| Transport Length* | G | 2220* | | 2600* | | 2865* |
| Transport Width* | H | 1090* | | 1350* | | 1650* |
| Transport Height* | J | 980* | | 1250* | | 1550* |
| Steam Outlet | DN | DN25 | | DN40 | | DN50 |
| Safety Valve Outlet | DN | DN25 | | DN25 | | DN25 |
| Water Inlet | DN | DN25 | | DN25 | | DN25 |
| Blowdown Outlet | DN | DN25 | | DN25 | | DN32 |
| Transport Weight (stripped down) | Kg | 1000 | | 1600 | | 2700 |
| Weight Empty | Kg | 1200 | | 1800 | | 3000 |
| Weight Full to NWL | Kg | 1560 | | 2600 | | 4370 |

* Transport measurements are based on boiler being laid on its back.
For illustration purposes only. Design drawing available upon request





YORKSHIREMAN

Three pass wetback - Suited to medium to heavy steam load.

Sizes: from 1,000 to 18,000 kg/hr
Working pressure: up to 23 bar gauge

- Low NO_x
- High quality dry steam across a wide range of operating conditions thanks to the generous shell & furnace dimensions
- Thermal stresses are alleviated due to a central furnace and flat flanged end plates
- Heat losses are minimised with high-density external insulation
- By using high-performance, ceramic materials we have eliminated problems associated with traditional refractory cement
- Faster NDT inspections as a result of multiple inspection ports, removable cladding panels, front & rear doors, as well as zero refractory on gas and light oil fired boilers
- Quality assured. Our internal inspection regime exceeds BS and EN requirements; this includes 100% ultrasonic inspections of all major welds
- Manufactured in Britain. All our boilers are individually built to customer Requirements
- Our standard range includes all fittings necessary for a working boiler including a sample cooler and NDT inspection panels. Larger boilers include access ladders and gantries

Eliminating the cracks

We only weld the heat transfer tubes at the hottest end to allow the tubes to expand and contract with the boiler, eliminating tube-end cracks that are typical of boilers with tubes fixed at both ends.



YORKSHIREMAN²

As part of a 2 year research and development programme, in conjunction with Leeds University, Byworth developed the Yorkshireman2 boiler. Aware that running costs are of paramount importance to steam users, the brief was, by rigorous testing, to ascertain and prove the optimum configuration of shell, furnace, and tubes for maximum boiler efficiency and low emissions.

This boiler range incorporates many energy saving features including the unique X-ID boiler tube, making the multi-award winning Yorkshireman2 the most energy efficient steam boiler available in the UK today with an efficiency of approximately 95%*

**Based on nett calorific values in accordance to EN12953*

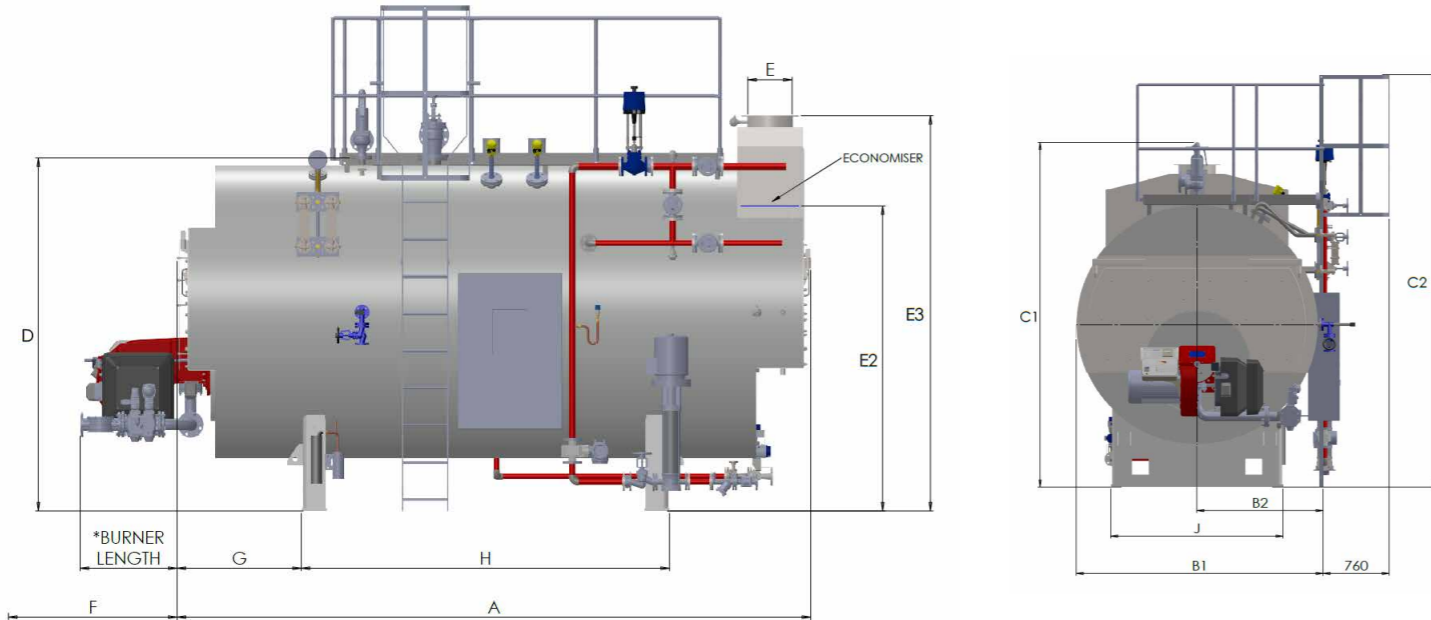
The unique X-ID tubes are an exciting feature defining the outstanding efficiency of the Yorkshireman2. With special helical internal ribs, this tube gives a significant 80% increased heat transfer over normal tube.



Check out the Unity Boiler house control system for improved fuel saving.
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The Yorkshireman Dimensions



| Model YSXLN / Y2SXLN | | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11250 | 12500 | 13750 | 16000 | 18000 |
|-----------------------------------|-----------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Duty F & A 100°C | lb/hr | 2200 | 3300 | 4400 | 5500 | 6600 | 7700 | 8800 | 9900 | 11000 | 13200 | 15400 | 17600 | 19800 | 22000 | 24800 | 27600 | 30300 | 35100 | 39700 |
| | kg/hr | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11250 | 12500 | 13750 | 15900 | 18000 |
| | kW | 627 | 940 | 1254 | 1567 | 1881 | 2194 | 2508 | 2821 | 3135 | 3762 | 4389 | 5016 | 5642 | 6269 | 7053 | 7837 | 8620 | 9968 | 11285 |
| Overall Length* | A | 3367 | 3777 | 4072 | 4603 | 4782 | 4967 | 5236 | 5254 | 5566 | 5883 | 6194 | 6473 | 6477 | 6903 | 6991 | 7339 | 7614 | 7891 | 8041 |
| Overall Width | B1 | 1820 | 2120 | 2235 | 2420 | 2450 | 2555 | 2610 | 2675 | 2690 | 2820 | 2906 | 3128 | 3245 | 3315 | 3340 | 3510 | 3560 | 3800 | 3900 |
| Width Dimension | B2 | 1010 | 1217 | 1267 | 1377 | 1367 | 1432 | 1445 | 1480 | 1465 | 1529 | 1558 | 1690 | 1725 | 1758 | 1730 | 1815 | 1815 | 1978 | 2000 |
| Overall Height | C1 | 2490 | 2653 | 2901 | 3051 | 3191 | 3271 | 3355 | 3415 | 3540 | 3672 | 3786 | 4046 | 4145 | 4217 | 4455 | 4625 | 4700 | 4879 | 5035 |
| Overall Height with Ladder | C2 | n/a | n/a | 3490 | 3640 | 3720 | 3796 | 3980 | 3940 | 4000 | 4132 | 4246 | 4426 | 4590 | 4664 | 4774 | 4940 | 5020 | 5194 | 5350 |
| Minimum Height | D | 2150 | 2263 | 2466 | 2616 | 2696 | 2776 | 2860 | 2920 | 2980 | 3112 | 3226 | 3406 | 3505 | 3577 | 3685 | 3855 | 3930 | 4109 | 4265 |
| Chimney I/D Standard | E1 | 225 | 250 | 300 | 350 | 350 | 400 | 400 | 450 | 450 | 500 | 550 | 550 | 600 | 650 | 650 | 700 | 750 | 800 | 850 |
| Chimney I/D with Economiser | E1 | 200 | 225 | 250 | 300 | 300 | 350 | 350 | 400 | 400 | 450 | 500 | 550 | 550 | 600 | 650 | 650 | 700 | 750 | 750 |
| Chimney Height | E2 | 1865 | 1988 | 2108 | 2203 | 2248 | 2348 | 2390 | 2435 | 2485 | 2606 | 2683 | 2783 | 2860 | 2762 | 2850 | 2915 | 2985 | 3152 | 3275 |
| Chimney Height with Economiser | E3 | 2450 | 2618 | 2688 | 2803 | 2853 | 2918 | 3100 | 3150 | 3185 | 3306 | 3493 | 3723 | 3700 | 3772 | 3910 | 3940 | 4005 | 4087 | 4340 |
| Tube Withdrawal | F | 2730 | 3030 | 3230 | 3730 | 3860 | 3960 | 4230 | 4230 | 4480 | 4732 | 4980 | 5230 | 5214 | 5510 | 5560 | 5830 | 6010 | 6330 | 6330 |
| Base inset | G | 570 | 610 | 695 | 840 | 880 | 950 | 975 | 996 | 1056 | 1000 | 1070 | 1100 | 1170 | 1196 | 1200 | 1240 | 1270 | 1180 | 1230 |
| Max. distance over base | H | 2140 | 2388 | 2540 | 2620 | 2840 | 2830 | 3000 | 3070 | 3210 | 3700 | 3800 | 3890 | 3920 | 4015 | 4276 | 4470 | 4720 | 5030 | 5030 |
| Max. width base | J | 1120 | 1120 | 1280 | 1470 | 1470 | 1620 | 1720 | 1720 | 1770 | 1870 | 2070 | 2070 | 2320 | 2320 | 2320 | 2420 | 2420 | 2590 | 2590 |
| Feed Pump - 150psi | DN | 25 | 25 | 25 | 25 | 25 | 32 | 32 | 32 | 32 | 40 | 40 | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 50 |
| Crown Valve Outlet - 150psi | DN | 50 | 65 | 80 | 80 | 100 | 100 | 100 | 100 | 125 | 125 | 125 | 150 | 150 | 150 | 200 | 200 | 200 | 200 | 200 |
| Safety Valve Outlet - 150psi | DN | 40 | 40 | 50 | 50 | 50 | 65 | 65 | 65 | 65 | 80 | 80 | 80 | 100 | 100 | 100 | 100 | 100 | 125 | 125 |
| Blowdown Valve | DN | 32 | 32 | 32 | 32 | 32 | 32 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Weight Empty | kg | 4525 | 5750 | 7040 | 8879 | 10161 | 11260 | 13150 | 13870 | 15370 | 17890 | 20500 | 22770 | 25289 | 29500 | 31440 | 32167 | 33546 | 37493 | 39545 |
| Weight to NWL | kg | 6965 | 9230 | 11430 | 14737 | 16926 | 18700 | 21710 | 22775 | 25260 | 29160 | 33520 | 38560 | 43195 | 49280 | 52420 | 56372 | 59350 | 67946 | 73470 |
| Flooded Weight | kg | 7316 | 9700 | 12021 | 15629 | 17903 | 19840 | 22960 | 24164 | 26819 | 31131 | 36000 | 41168 | 46803 | 52265 | 57188 | 62406 | 65869 | 76083 | 82993 |
| Total Heating Surface | m2 | 21.4 | 31.3 | 42.6 | 57.3 | 72.5 | 79.2 | 91.4 | 99.6 | 114.4 | 147 | 177 | 213 | 213 | 242 | 281 | 313 | 312 | 368.7 | 405.8 |
| Steam Release Area | m2 | 3 | 3.1 | 3.9 | 5 | 5.2 | 5.8 | 3.2 | 6.3 | 6.88 | 7.6 | 8.8 | 9.7 | 11 | 11.1 | 12 | 14.1 | 15.1 | 17.2 | 18.4 |
| Steam Space Volume | m3 | 0.35 | 0.47 | 0.59 | 0.89 | 0.98 | 1.14 | 1.25 | 1.39 | 1.56 | 1.87 | 2.48 | 2.60 | 3.60 | 2.99 | 4.77 | 6.03 | 6.52 | 8.14 | 9.52 |

Note - for YSX8000 and above support saddles supplied only
 * Variable depending upon burner manufacturer
 For illustration purposes only design drawings available upon request





Heat Recovery Range

At Byworth we leverage our extensive expertise in efficient industrial heating solutions. Our heat recovery range is designed to achieve optimum performance given the heat available and the boiler output required.

Waste heat boilers can recover heat which is produced as a by-product of another process, turning heat that would otherwise be lost into useful steam or hot water.

As well as a range of single pass waste heat boilers to suit the most commonly available gas engines, Byworth are able to design bespoke waste heat boilers to suit other applications. All boilers are designed to achieve optimum performance given the heat available and the boiler output required.

Our waste heat recovery units are an ideal solution for fluid heating from gas turbine exhaust, internal combustion engine exhaust and process heat sources.

Byworth can also supply two pass, three pass, or composite boilers to meet specific customer and process requirements.

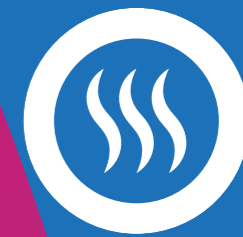
Composite boilers have a conventional fired section as the primary energy source, supplemented by waste heat when available. Alternatively, waste heat may be the primary source topped up by the burner when required.



Composite vs Single Pass Waste Heat

Composite boilers are sized to avoid problems often associated with more conventional CHP systems where the small, waste heat boiler is unable to cope with big swings in demand, therefore, requiring backup from often aged, conventionally fired boilers. The result is composites have less engine trips and improved steam quality.





Economisers

Available as an integral, cartridge-type unit which is pre-piped and mounted to a new boiler or as a stand-alone unit.

Economisers and air preheaters are an easy way to maximise the efficiency of your combustion plant by recovering waste heat from the flue gases into the boiler feed water or combustion air.

Economisers

A typical economiser will reduce the flue gas temperature by between 70°C and 100°C, raising the feed water temperature by 20°C to 35°C in the process and saving between 4% and 6% on the cost of fuel.

Economisers are constructed from extended surface steel tubes in a steel casing with water flowing through the tubes while the hot gases pass over the outside. Cartridge-type economisers can be supplied with the M-Series and Yorkshireman boiler ranges at time of manufacture while external units are suitable for on-site installation and retrofit to existing boilers.



Solutions To Fit Your Environment

Packaged Boiler Housing and Energy Centres:

Options range from cost-effective skid mounted boilers and ancillaries, through purpose built pre-fabricated boiler houses, to site-erected portal frame apex roofed building.



Totally mobile

Larger boilers can be trailer mounted for use where steam or hot water is required remotely.





Skid-mounted Boiler

These packages save you time and money by having all interconnecting piping and wiring completed in our factory before despatch.

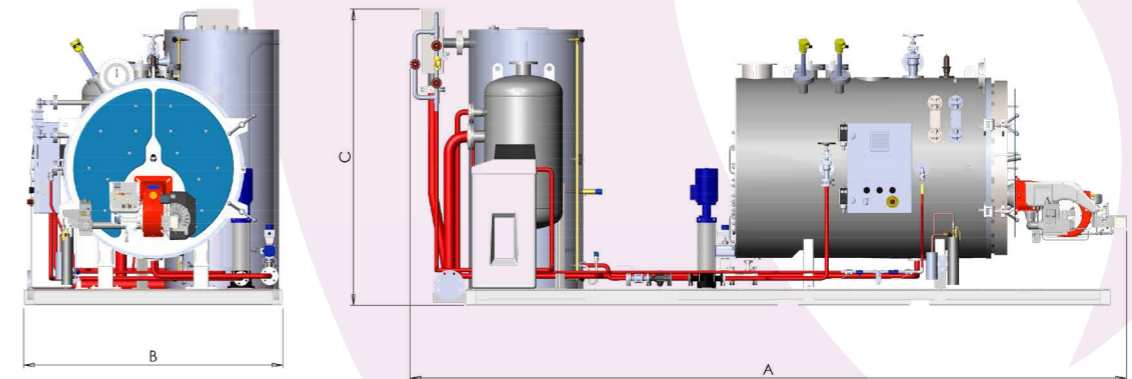
Built with the customer in mind, these ultra-compact, pre-assembled units are supplied with all the essential boiler accessories needed to make a complete system.

Skid mounted boiler contents:

- M-Series Boiler
- Hotwell tank with steam injection system
- Blowdown vessel with vent head
- Feed pump and isolation valve
- Single fuel high/low burner

Optional extras:

- Water softener
- Chemical dosing to suit site requirements



M-SERIES - Skid Package Dimensions

| Model M-Series -Skid | | 250 | | 500 | | 1000 | | 1360 | | |
|-----------------------------|-------|-----------|-----|-----------|------|-----------|------|-----------|------|------|
| Duty F & A 100°C | lb/hr | 500 | 550 | 1000 | 1100 | 1500 | 2000 | 2200 | 2500 | 3000 |
| | hp | 14 | 16 | 29 | 32 | 43 | 58 | 64 | 72 | 87 |
| | kg/hr | 227 | 250 | 454 | 500 | 681 | 908 | 1000 | 1135 | 1362 |
| | kW | 146 | 160 | 292 | 322 | 438 | 584 | 644 | 730 | 876 |
| Skid Overall Length | A | 3270 | | 3765 | | 5250 | | 5250 | | |
| Skid Overall Width | B | 1600 | | 1600 | | 2050 | | 2050 | | |
| Approx. Overall Height | C | 1550 | | 2250 | | 2300 | | 2300 | | |
| Chimney Outlet Height | | 1340 | | 1510 | | 1870 | | 1930 | | |
| Chimney Diameter ID | | 125 | | 200 | | 225 | | 250 | | |
| Steam Outlet | | 25NB | | 40NB | | 50NB | | 65NB | | |
| Safety Valve Outlet | | 11/4" BSP | | 11/4" BSP | | 11/4" BSP | | 11/2" BSP | | |
| *Weight Empty (Shipping) | kg | 1650 | | 2250 | | 4825 | | 5650 | | |
| *Weight Full to NWL | kg | 2500 | | 3400 | | 6400 | | 8000 | | |

*Approx. weight

For illustration purposes only design drawings available upon request





Pre-fabricated Boiler House

If you are looking for a modern self-contained energy centre, benefits include:

Innovation

A simple 'plug-and-play' solution significantly reduces on-site disruption

Sustainable approach

Reduce impact on the local environment – fewer resources on site, fewer site deliveries, less noise, less waste

Programme certainty

Constructed, pre-wired and tested to individual customer requirements prior to despatch, thus generating time-savings on-site

Flexibility

The asset can be moved and installed in other locations either on the same site or other sites providing future operational flexibility

Design for Life

40 year guarantee against corrosion and UV degradation in any normal outside environment (boiler house cladding only), with a time to first maintenance being circa 25-30 years for inland areas, ensures the longevity of the asset.

Boiler house contents:

- Steam boiler
- Blowdown tank
- Duplex water softener
- Chemical dosing
- Feed tank
- Fire detection
- Internal lighting
- Pre-piped and wired
- Water Treatment



The prefabricated boiler house is easily transportable with minimal onsite disruption during installation.



Portal Frame Boiler House

Ideal for larger boilers and multi-boiler installations, this complete package is pre-assembled off-site, delivered in sections, and finished on your site with the minimum of fuss.

With complete control over both the contents and the layout, the portal frame option offers customers the greatest flexibility of our packaged options.

Portal frame contents:

- Single or multiple boiler(s)
- Blowdown tank
- Water treatment systems
- Feed tank/ deaerator
- Steam distribution header
- Fire detection
- Pre-piped and wired

A range of optional components:

- Pressure reducing station
- Blowdown heat recovery
- Steam to water heat exchangers
- Waste heat boiler or CHP
- Metering
- Boiler sequence controls



Unity

Smart technology reduces your energy.

Energy costs only go in one direction. Similarly, the cost of fossil fuels is volatile, therefore the price is unlikely to last. If a plant has a lifecycle measuring over decades, it becomes desirable to optimise the way industrial processes use energy. Applying this approach guarantees the plant remains economically viable for the long-term.

Advanced Boiler Control

Unity is an advanced boiler control system offering unprecedented management, efficiency, visibility and fingertip control, recording and cross-referencing data trends from every discrete system area to implement efficiency and cost-saving responses.

The System

Capable of handling dozens of simultaneous I/O's, Unity is suitable for any boiler house; from control of a single boiler to complex multi-boiler, hybrid-fuel installations incorporating waste heat and composite boilers.

Intelligent decisions based on the systems measured values are made to ensure efficient plant operation and reduce operational stress to decrease downtime and increase plant life.

Harnessing the Power of Big Data

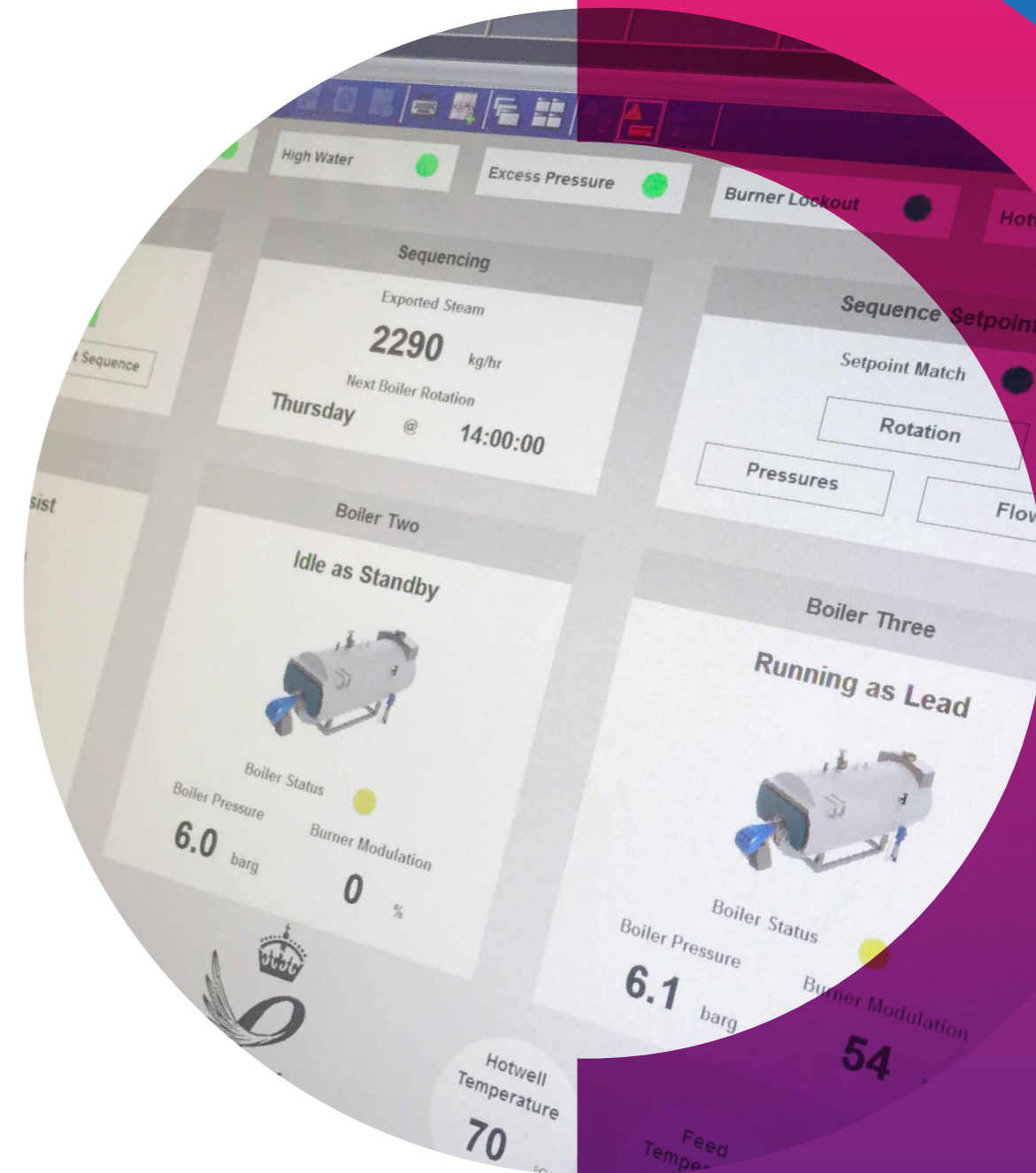
The revolutionary boiler control system harnesses the power of digital technology to transform the industrial boiler industry. Unity offers the leading solution for any industry using process steam.

The system employs the Internet of Things (IoT) to remotely monitor and diagnose faults to systematically change boiler-related operations and services.

Its value is in its capability to significantly reduce cost, improve product & service performance and provide better value to our customers. Utilising a cloud platform we are able to collect and combine data from each customer, we are able to uncover data insights; analysing, managing and integrating much broader operational data than ever before.

Encompassing a range of smart data, predictive tools and engineering proficiency to obtain additional insight, the results will help customers reduce fuel usage, increase operational efficiency and significantly reduce any potential downtime. Delivering a step-change in boiler servicing, Unity helps improve response time as well as enhancing onsite efficiency

Unity, the first product of its kind on the market, has achieved outstanding results and has been rewarded a 2016 Queen's Award for Enterprise in Innovation





Unity

The User Experience and Interface

Accessible via a built-in touch screen and remote desktop.

Quick access to trend data and alarm logs. A simple green, amber, red warning system instantly draws operator attention to changes in plant conditions

User controllable functions that can be programmed and monitored through the HMI include:

- time sequencing and scheduling
- fuel switching or set point adjustments
- selectable setback pressures
- night setback
- automated two stage cold start
- trending of measured values
- logging of alarms
- automated water tests
- automated feed pump rotation
- automated bottom blowdown
- operator user groups
- hotwell level and temperature control
- hints to possible fault causes
- fuel metering (instantaneous and totalised)
- boiler sequencing on actual steam output
- three-part water level control
- chemical dosing pump control
- feed forward burner control

Step-by-step guides to implement best practice boiler checks and maintenance regimes

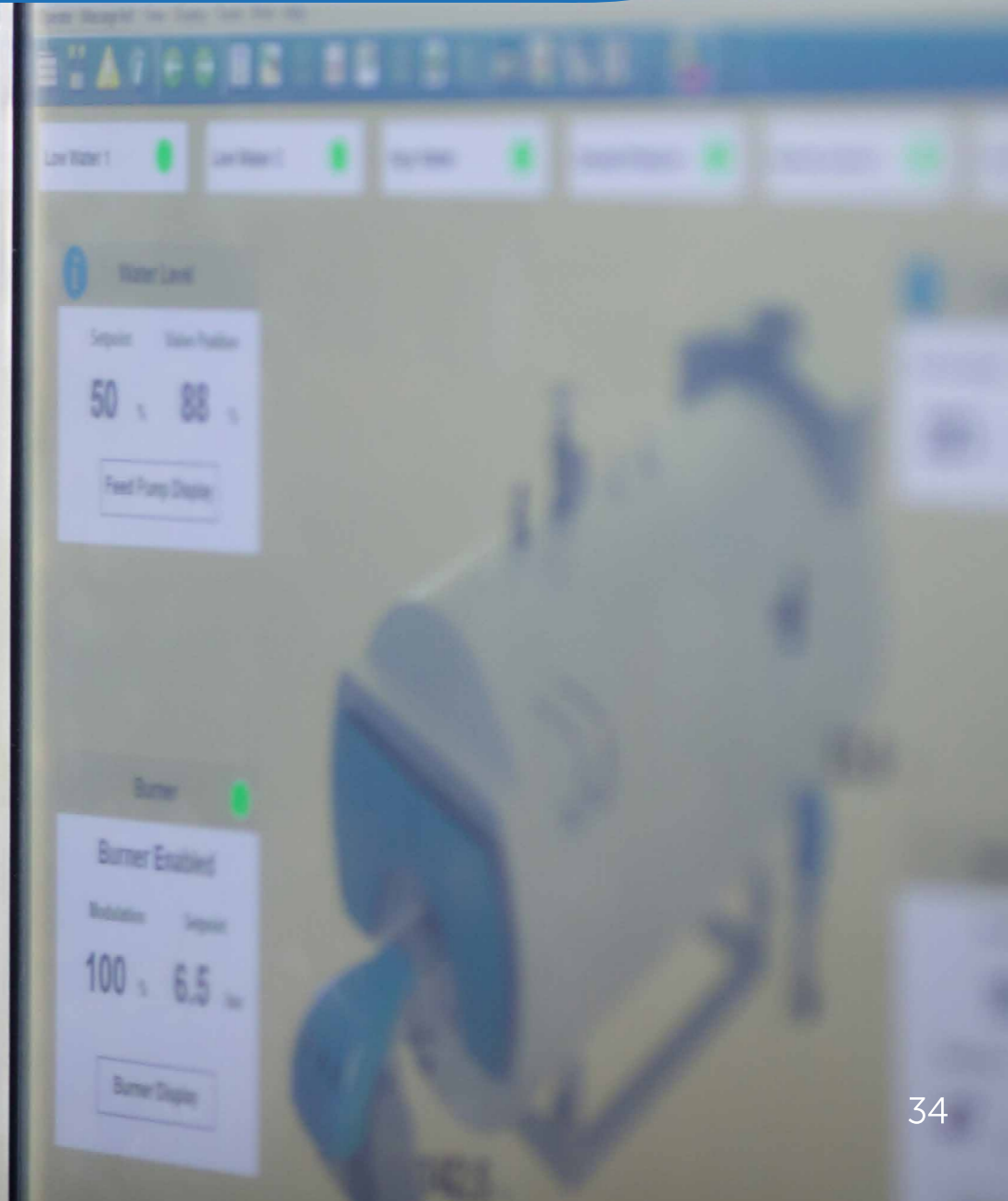
Big Data = Reduced Downtime & Opex

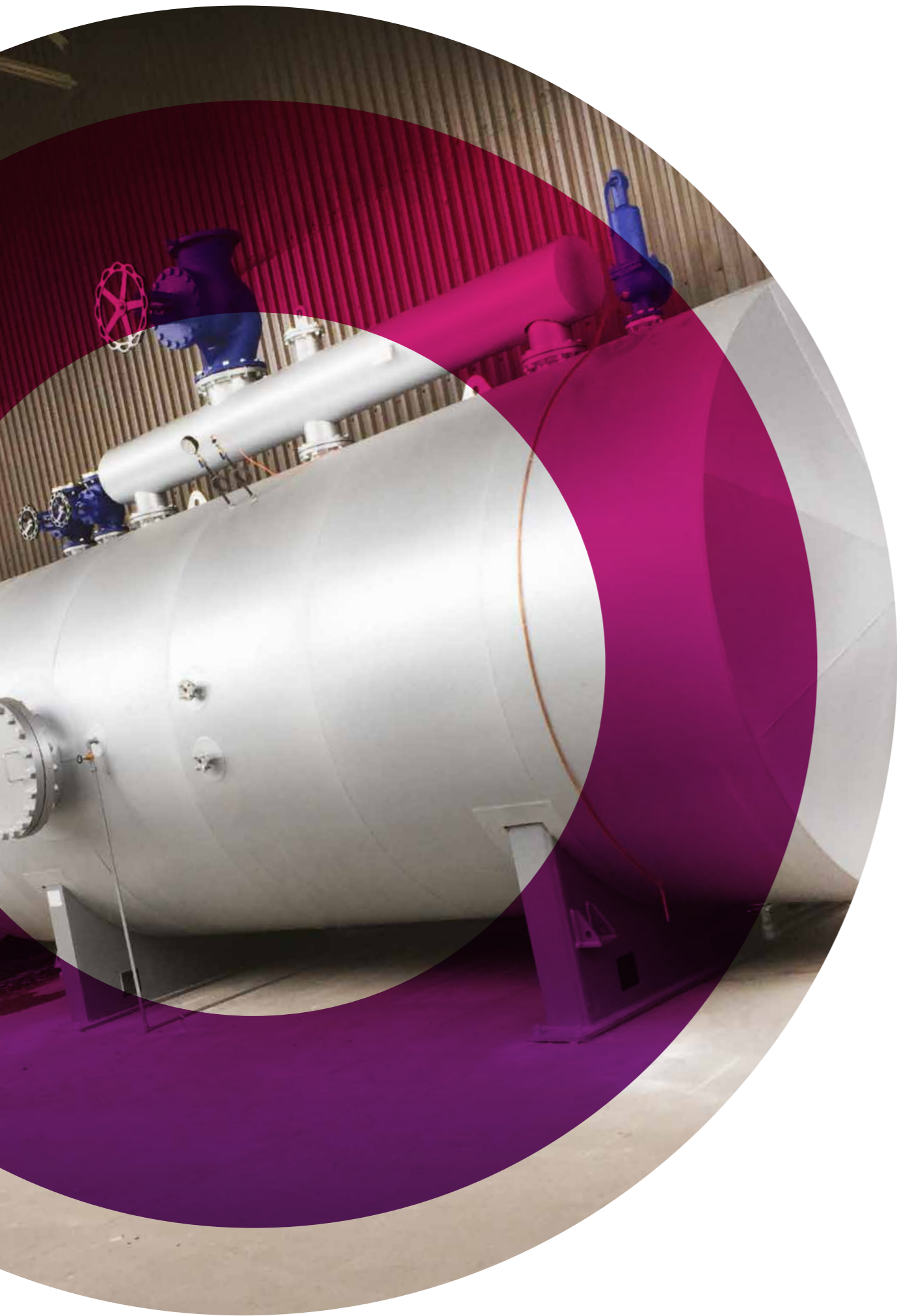
Unity manages precise data from your boiler house to predict and prevent boiler failure, significantly reducing downtime. The pioneering system employs Industry 4.0 technology to deliver reduced operating costs and safer management of industrial boiler houses.

Unity controls and manages a boiler house as one entity rather than relying on various third party control systems; creating a considerably more efficient and configurable plant.

Data is accessible from the cloud; enabling plant managers to optimise the relationship between boiler and process by understanding when large peaks and troughs are happening.

The intelligent use of data allows site managers and operators to react more quickly to plant conditions, reducing the number of start-stop cycles, fuel and water usage.





Steam Accumulators

Managing variable steam loads

While it is desirable to have combustion equipment with a high turn down in order to avoid excessive cycling and the resultant loss of efficiency, it is not advisable to operate boilers close to their minimum output for prolonged periods. Boilers are at their most efficient when operating around 70% of nameplate capacity, therefore, factories that experience highly variable steam demand would likely benefit from sizing boilers for their average load (instead of peak load) and incorporating a steam accumulator to smooth out the peaks and troughs in demand for steam.

Working Principle of Accumulators

When high-pressure, saturated water is exposed to low pressure, a percentage of this water will flash off into steam through using the remainder sensible heat in the water. The proportion of flash steam (kg of steam/kg of water) depends on the difference in pressure at which the hot water is exposed.

When plant experiences low steam demand, and the boiler can generate more steam than it needs (i.e. at maximum continuous rating of boiler), the unused, excess steam is injected into water that is stored under pressure inside the accumulator.

After some time, the temperature of stored water will increase to saturation temperature in line with the operating pressure of the boiler. When steam demand is high, in that it exceeds the maximum capacity of the boiler, it creates a drop in pressure in the accumulator which results in some of the water flashing into steam. Consequently, it can achieve the high steam demand without affecting the normal boiler operation.

Discharging of Accumulators

If the steam demand is higher than the boiler capacity, the pressure drops in the steam accumulator where the water is stored at saturation temperature. The pressure drop in the accumulator results in flash steam being generated, which offsets the high load requirement without effecting the normal boiler operation.

When the overload condition has stopped, it is subsequently followed by off-peak load, allowing excess steam to be injected into the accumulator. At this point, the accumulator will be ready to handle the next overload in demand. Consequently, the accumulator allows the boiler to achieve its preferred operating pressure and maximum efficiency.



Hotwell Tanks and Deaerators

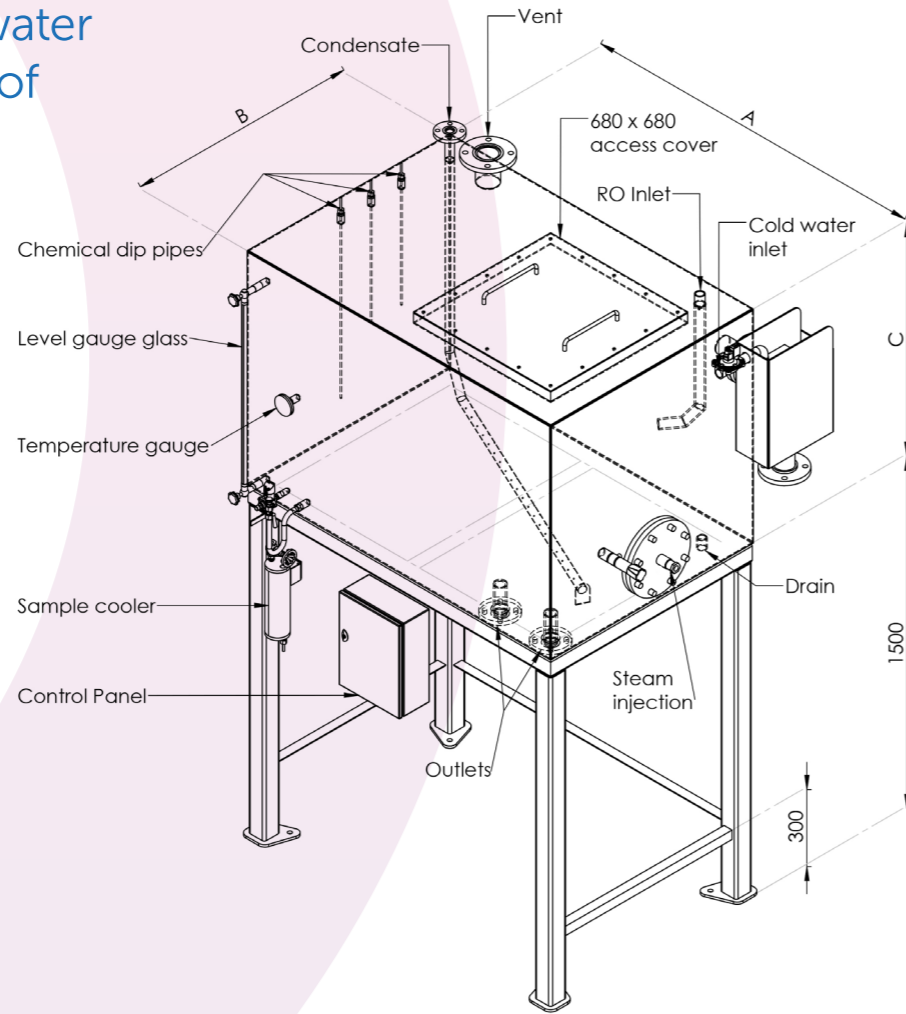
The temperature of the water being fed to the boiler is of paramount importance.

Condensate contains approximately 25% of the energy of steam; so recovering as much condensate as possible is key to maximising operational efficiency.

Hotwell tanks and Deaerators are used to store recovered condensate whilst mix it with fresh make-up water, helping to drive off dissolved oxygen, reducing the need for chemical oxygen scavengers and improving system efficiency.

All Hotwell tanks are manufactured from stainless steel, insulated with high-density mineral wool to minimise heat losses and externally clad with self-coloured Aluzinc.

Steam injection systems are highly recommended to ensure feed water is stored at the correct temperature. Semi or full deaerator heads are available upon request.



| Capacity (ltrs) | 0.56m ³ | 0.75m ³ | 1m ³ | 1.5m ³ | 2m ³ | 2.5m ³ | 3m ³ | 3.75m ³ | 4.5m ³ | 6.75m ³ | 7.5m ³ | 8m ³ | 9m ³ | 12m ³ |
|-----------------|--------------------|--------------------|-----------------|-------------------|-----------------|-------------------|-----------------|--------------------|-------------------|--------------------|-------------------|-----------------|-----------------|------------------|
| A | 1m | 1m | 1m | 1.5m | 2m | 2.5m | 2m | 2.5m | 3m | 3m | 3m | 4m | 4m | 4m |
| B | 0.75m | 0.75m | 1m | 1m | 1m | 1m | 1m | 1m | 1.5m | 2.5m | 2m | 1.5m | 1.5m | 2m |
| C | 0.75m | 1m | 1m | 1m | 1m | 1m | 1.5m | 1.5m | 1.5m | 1.5m | 1m | 1m | 1.5m | 1.5m |
| Outlets | DN32 | DN32 | DN32 | DN40 | DN40 | DN40 | DN50 | DN50 | DN50 | DN50 | DN65 | DN65 | DN65 | DN80 |
| Overflow | DN65 | DN65 | DN65 | DN65 | DN65 | DN65 | DN65 | DN100 | DN100 | DN100 | DN100 | DN100 | DN100 | DN100 |
| Vent | DN50 | DN50 | DN50 | DN80 | DN80 | DN80 | DN100 | DN100 | DN100 | DN100 | DN100 | DN100 | DN100 | DN100 |
| Drain | 1" | 1" | 1" | 1" | 1" | 1" | 1½" | 1½" | 1½" | 1½" | 1½" | 2" | 2" | 2" |
| Inlets | 1" | 1" | 1" | 1" | 1" | 1" | 1" | 1½" | 1½" | 1½" | 1½" | 1½" | 2" | 2" |
| Condensate* | DN20 | DN20 | DN20 | DN25 | DN25 | DN32 | DN32 | DN32 | DN40 | DN40 | DN50 | DN50 | DN50 | DN50 |

*Condensate subject to change (data based on 80% return).
For illustration purposes only. Design drawing available upon request





Blowdown Receivers

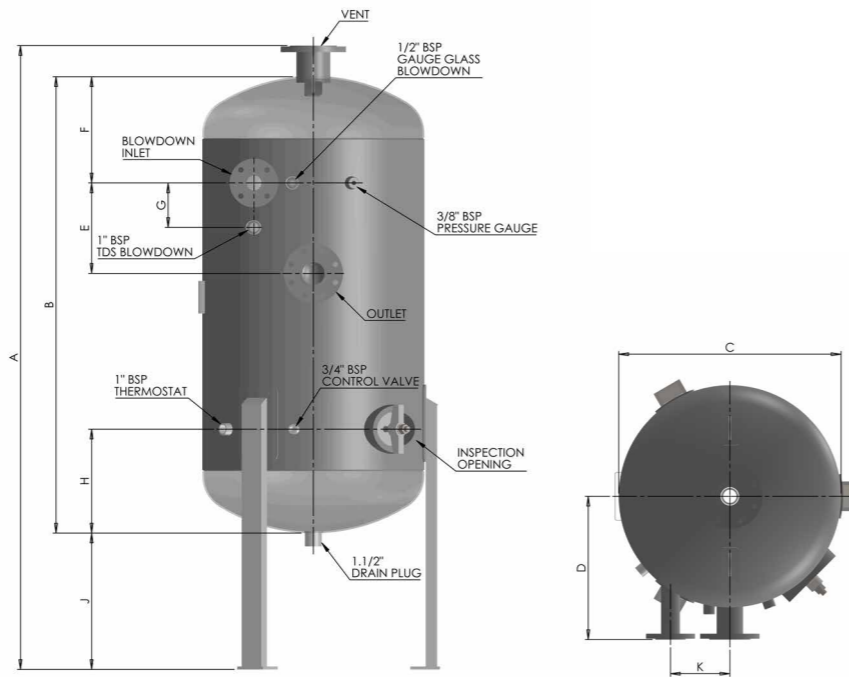
All steam boilers must be regularly blown down to reduce the concentration of suspended and dissolved solids in the boiler water.

As this waste is under pressure and at extreme temperature there must be a safe means of storage and cooling (to below 43 degrees C) before discharging to general drainage.

Byworth manufacture a range of blowdown vessels to suit a wide range of boilers.

Our tanks are deigned and built to PD5500 and meet the requirements of the Combustion Engineering Association's guidance document BG03.

Optional extras include vent heads, cooling water injection systems and multi-boiler manifolds.



| Model No. | A | B | C | D | E | F | G | H | J | K | Vent Size | Blowdown Inlet Size | Outlet Size | Inspection Opening Size | Approx. Weight (kg) |
|-----------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----------|---------------------|-------------|-------------------------|---------------------|
| BT0 | 1365 | 808 | 393 | 290 | 160 | 201 | 120 | 218 | 458 | 120 | DN80 3" | DN40 1.1/2" | DN50 2" | 2" BSP Sight Hole | 109 |
| BT1 | 1760 | 1200 | 610 | 406 | 188 | 288 | 150 | 305 | 455 | 200 | DN100 4" | DN50 2" | DN80 3" | 180 x 120mm | 210 |
| BT2 | 2103 | 1538 | 749 | 483 | 305 | 358 | 150 | 350 | 460 | 200 | DN100 4" | DN50 2" | DN80 3" | 180 x 120mm | 273 |
| BT3 | 2312 | 1756 | 895 | 560 | 305 | 455 | 0 | 475 | 454 | 200 | DN150 6" | DN50 2" | DN100 4" | 320 x 220mm | 402 |
| BT4 | 2535 | 1981 | 1054 | 635 | 355 | 418 | 0 | 438 | 452 | 200 | DN200 8" | DN50 2" | DN150 6" | 320 x 220mm | 635 |
| BT5 | 2700 | 2143 | 1369 | 770 | 400 | 494 | 0 | 514 | 450 | 300 | DN200 8" | DN50 2" | DN150 6" | 320 x 220mm | 850 |

All flange connections to BS EN1092:2003 PN16
For illustration purposes only. Design drawing available upon request



For further details contact our Spares Department on +44 (0)1535 665225 / spares@byworth.co.uk



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