Boiler Water Treatment

Guidance for shell boilers, coil boilers, steam generators and hot water boilers

Ref: BG04

ICOM Energy Association

CEA Combustion Engineering Association

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ABOUT THIS GUIDE

This comprehensive guide deals with all aspects of water treatment for steam boilers, steam generators and hot water boilers. This document applies to industrial and commercial steam and hot water boiler plant, including steam generators, operating at a working pressure of between 0.5 and 32bar gauge (except where stated) and a working temperature between 110°C and 239°C. We trust that by studying the contents and following the freely given advice your boiler plant will operate safely and more efficiently, and provide you with a trouble-free system. If in any doubt, contact your boiler water treatment expert for further advice.

Having considered who is responsible for looking after steam boilers, steam generators and hot water boilers and also who is responsible for managing the safe operation of this type of equipment, the Combustion Engineering Association (CEA) and ICOM Energy Association agreed to write this guide, with the help of our respective Members.

It is aimed as a document that can be read and understood by boiler operators, engineers and personnel with limited or no knowledge of water treatment chemistry. It is also intended to help them understand what effect any water and its subsequent treatment will have on their boiler plant.

Naturally, we cannot accept any liability for the information provided in this guide; however, be assured that we have consulted widely with our member companies during the compilation of the guide.

ACKNOWLEDGEMENTS

Specific thanks are due to David Young of Cochran Ltd who, as Chairman of the ICOM Industrial Boiler Group and the Technical Committee, as well as a Member of CEA and the chairman of this working group, has been responsible for the revision of the information which was previously in booklet format. Also, thanks go to Mick Casey of Deep Water Blue Ltd for the boiler water treatment chemistry information used when compiling the final document, and to all of those who have given their time freely and contributed to this guide.

Contributors to BG04 are:

- Deep Water Blue Ltd
- Industrial Boiler House Safety, and Chairman of the CEA
- GEMchem Ltd
- Fernox Ltd
- Aquanet International Limited
- ICOM Energy Association (ICOM)
- Combustion Engineering Association (CEA)
- Cochran Ltd
- Air and Water Consultants Limited
- Fulton Boiler Works (GB) Ltd
- Cochran Ltd

And thanks are given to the other members of both ICOM and the CEA who have been consulted.

The pictures, tables and diagrams in this guide are courtesy of*:*

- Deep Water Blue Ltd
- GEMchem Ltd
- ICOM Energy Association
- Cochran Ltd
- M&M Training
- Byworth Boilers Ltd
- Babcock Wanson UK Ltd
- SAACKE Combustion Services Ltd

SCOPE

This document applies to those industrial & commercial steam and hot water boiler plants, including steam generators, operating at a working pressure of between 0.5 and 32bar gauge and a working temperature between 110°C and 239°C.

The following boilers are specifically excluded from the scope of this Guidance Document:

- Water tube boilers such as would be found at an energy producer;
- Process Boilers with a capacity exceeding:
    - 70 tonnes steam per hour;
    - 46 MW thermal input;
    - 32 bar gauge working pressure;
- Domestic and commercial boilers smaller than 70kW thermal input;
- Manually operated boilers (i.e. those requiring constant human intervention).

This document also excludes from its scope any consequences arising from incorrect steam pressure delivery from the boiler.

THE PURPOSE OF THIS GUIDE

Boiler failures can, and do, occur more frequently than are reported. The common reasons for failures are:

- Non-operation of controls due to sludge accumulation;
- Perforation of smoke tubes due to corrosion;
- Less frequently, but even more serious, overheating, distortion and even collapse of the furnace caused by scale or other deposits.

All of the above can be avoided by correct boiler water treatment. Poor or inadequate water treatment has been shown to be the cause of more than 95% of all boiler failures. Often this is as a result of poor management of the water treatment regime by whoever is collectively deemed responsible.

All sources of water contain impurities which are harmful to steam and hot water boilers. All waters therefore need to be pre-treated and then chemically treated, either to remove these impurities or to minimise any adverse effects.

The Combustion Engineering Association and ICOM Energy Association are very pleased to be able, thanks to member input, to provide this publication relating to water treatment for shell boilers, coil boilers, steam generators and hot water boilers.