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TABLE OF CONTENTS

CHAPTER	DESCRIPTION	PAGE
	INTRODUCTION	
	BACKGROUND	
	SAFETY PRECAUTIONS AND WARNINGS	
1	FEEDWATER AND BOILER WATER	10
	Feedwater	11
	Boiler Water	12
	Carry Over	15
	Boiler Service	15
	Pressure	16
2	FEEDWATER PRETREATMENT SYSTEMS	17
	Cartridge Filters	17
	Chemical Treatment Equipment	18
	Biocides	18
	Coagulants	18
	Disinfectants	18
	Filming Amines	18
	Flocculants	18
	Neutralizing Amines	18
	Neutralizing Agents	19
	Organic Oxygen Scavengers	19
	Scale Inhibitors	19
	Coagulants / Flocculants	20
	Condensate Receiver (Hot Wells)	21
	Deaerators	21
	Deaerator Types	22
`	Tray Deaerators	22
	Spray Deaerators	23
	Cold Water Deaerators	23
	Dealkalizers	23
	Demineralizers	24
	Iron and Manganese Filters	26
	Media Filters	27
	Microfiltration / Ultrafiltration	28
	Reverse Osmosis Equipment	29
	Softeners	31

3	BOILER INSTALLATION AND START-UP	33
	Installation and Start-up	33
	Pre-start System & Component Checkout	33
	Installation & Start-Up Checklist	34
	Boil out of a New Unit	35
	System Clean Out	36
	Additional Information for Steam Systems	36
	Additional Information for Hot Water Systems	38
	Arrangement for Flushing Hot Water Heating Systems	38
	Temporary Use	40
	Operator Skills / Responsibilities	40
	During Operation	40
4	BOILER BLOW-OFF AND BLOWDOWN SYSTEMS	41
	Bottom Blow-off Systems	41
	Surface Blowdown Systems	42
5	TESTING AND SAMPLING	44
	Steam Boiler Systems	44
	Make-up	44
	Feedwater	45
	Boiler Water	45
	Condensate	46
	Hot Water Boiler Systems	46
	Make-up	46
	Boiler Water	46
	Daily Boiler Log	47
	Sampling	49
	Steam Sampling Nozzle – Multiport Type	50
	Recommended Corrosion Test Specimen	51
6	BOILER CLEANING	52
	How to Clean a Hot Water Heating System	52
	Boiler Operation after Cleaning	52
	Chemical and Mechanical Cleaning	52
7	IDLE BOILER CARE AND LAY-UP	54
	Taking Boilers Off-Line	54
	Pre-shutdown Precautions	55
	Wash Down	55

Steam Boilers	55
Short Term (30 days), Wet Lay-Up Steam Boilers	55
Long Term (over 30 days), Dry Lay-Up Steam Boild	ers 57
Desiccant Method	58
Nitrogen Blanket Method	59
Safety Precaution	59
Returning Idle Steam Boilers to Service	59
After Wet Lay-Up	59
After Dry Lay-Up	60
Lay-Up of a Hot Water Boiler	60
Wet Lay-Up	60
Long Term Dry Lay-Up of a Hot Water Boiler	61
Returning Idle Hot Water Boiler to Service	61
After Wet Lay-Up	61
After Dry Lay-Up	61
Safety Precautions	62
Fireside Lay-Up	62
Hot Lay-Up Boiler Idle	63
Cold Lay-Up	63
ELECTRIC BOILERS – SPECIAL CONSIDERATIONS	
FOR WATER TREATMENT	64
Electrode Boilers	64
Types of Treatment	65
Installation and Start-Up	66
DEFINITIONS AND GLOSSARY	68
REFERENCES	80

8

INTRODUCTION

The purpose of this publication is to acquaint engineers, purchasers and operators of industrial, commercial and institutional (ICI) boilers with ABMA's judgment as to the relationship between boiler water quality, boiler operation, and boiler performance. This document is published for general guidance as a supplement to detailed operating manuals supplied by the equipment manufacturers. It should also be noted that the information presented is directed to steel boiler designs, as opposed to cast iron sectional or copper finned tube boilers. Furthermore Utility Boilers and Combined Cycle Boilers, which require extremely close control of water quality and steam purity, are not the topic of this document.

This new document combines two previous ABMA Guideline documents, namely "Boiler Water Requirements and Associated Steam Purity for Commercial Boilers" (1998), and "Boiler Water Limits and Achievable Steam Purity for Watertube Boilers", (1995).

The document discusses the effect of various feedwater and condensate systems on the boiler operation. It also provides information on boiler water and steam testing as well as system care and maintenance.

It is recognized that specific boiler usage and water treatment will vary and may require values different from these recommendations. Boiler users therefore, need to define limits, equipment and operating parameters for their particular application.

These recommendations are for information only. Everyone is free to accept or reject the conclusions of these suggestions as their own judgment warrants in all aspects of the conduct of their business.

The ABMA does not represent or warrant that any level of steam purity depicted will be achieved by any particular boiler or boilers.

BACKGROUND

The American Boiler Manufacturers Association (ABMA) was established in 1888 as an association of commercial, industrial and utility boiler manufacturers and manufacturers of fuel burning systems.

In 1939, recognizing the need for information on boiler water and steam conditions, the association published boiler water conditions and steam purity recommendations. This work was reaffirmed and published in 1942, 1947 and 1954. A major revision was published in 1958 and reaffirmed in 1964. Since that time, there has been significant improvement in water treatment and the analytical techniques for measuring water and steam purity. In addition newer and more sophisticated plant designs require improved water and steam purity. Due to these developments and the fact that many users were unacquainted with the earlier work, the association recognized the need to update and republish these recommendations in 1982. That version represented significant change and was intended to reflect the current state of the art for steam generator water requirements. The Watertube version was further updated in 1995 to reflect more rigorous steam purity requirements for modern turbines and other applications requiring exceptionally high steam purity. The most recent version of the commercial boiler document was published in 1998. The 2005 combined version of the two water quality documents represents an updating to reflect current requirements for steam purity and water quality, particularly in view of the current interest in combined heat and power systems. The 2012 version updated the various types of feedwater treatment techniques commonly used and provided more depth into techniques and equipment functionality. The various product and technical groups within ABMA reviewed and revised the document prior to its 2012 republishing.

SAFETY PRECAUTIONS AND WARNINGS

1. Before commencing operations, follow the Boiler Manufacturers Installation and Start-Up Checklist, or if this is not available, the Installation and Start-up Checklist on page 34.

2. Neat feed of liquid chemicals is the recommended and safest practice because direct handling of chemicals is not required. However, when dissolving chemicals is required, the following should be observed:

- (a) Use of suitable face mask, goggles, protective gloves and garments is required when handling or mixing caustic chemicals.
- (b) Do not permit the dry chemicals or solution to come in contact with skin or clothing.
- (c) Always follow the safety precautions on the container's labeling.
- (d) Warm (80 to 100° F) water should be put into a suitable container.
- (e) Slowly introduce dry chemical into water, stirring at all times until the chemical is completely dissolved.
- (f) The chemical must be added slowly and in small amounts to prevent excessive heat and turbulence.

3. Boil out under pressure is not recommended for the class of boilers covered by this document. If units must be boiled out under pressure competent supervision must be provided.

4. If the boiler is not to be operated within 24 hours after boil out see the requirements of Chapter 7 on Lay-Up.

5. In existing systems the gradual introduction of filming amines is recommended to avoid the rapid removal of corrosion products. Fast removal of rust will cause plugging of traps and strainers (see page 18).

6. Boilers laid up dry shall be tagged with information to indicate the unit must not be operated until moisture-absorbing chemicals are removed and the boiler refilled (see also Chapter 7).

7. The use of nitrogen for blanketing is recommended in many of the lay-up procedures. Nitrogen will not support life; therefore, it is essential that proper precautions be taken before such equipment is entered for inspection or other purposes. These precautions shall include disconnecting of the nitrogen supply line, thorough purging and venting of the equipment with air and testing for oxygen levels inside the equipment. Appropriate caution signs shall be posted around the equipment to alert all personnel that nitrogen blanketing is in use.

8. Obtain <u>MATERIAL SAFETY DATA SHEETS</u> from the supplier for <u>ALL</u> <u>CHEMICALS USED</u> for water conditioning, cleaning and/or lay-up. Read and follow the recommended handling procedures and precautions. <u>Be aware of any potential health</u> <u>hazards from the chemicals being used</u>.