

Thermal Fluid Systems

A Practical Guide for Safe Design, Operation and Maintenance

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Foreword

This document, Thermal Fluid Systems - A Practical guide for Safe Design, Operation and Maintenance (BG07) has been developed and written by the Combustion Engineering Association (CEA) in consultation with its Members and other stakeholders within the thermal fluid industry to help designers, owners, managers and operators of new and existing thermal fluid heating systems to install and operate safe systems, and to make health and safety and environmental improvements in the industry. The objective is to help users of thermal fluid systems manage their own risks and create safe and efficient installations.

This first Edition of BG07 incorporates up-to-date information and best practices relating to the design and operation of thermal fluid systems primarily fired using conventional gas and light oil burners. Other thermal fluid systems fired using solid biomass and electrical direct heating methods are available but not specifically covered, but much of the basic health & safety information and the system design information herein will be relevant.

There are currently few authoritative documents available that cover the wide range of opportunities and challenges that thermal fluid systems offer for many specialised industrial processes, so the CEA members who are most closely involved with the supply of thermal fluid heaters, systems and the fluids themselves have gathered together their combined knowledge and many years of experience in producing this guide.

This publication has been written with specific regard to the law and best practices in the UK. Readers from other jurisdictions will find the guidance useful but will need to consider relevant local laws and regulations.

This publication should not be regarded as an authoritative interpretation of the law in the UK, nor a mandatory legal requirement. Users must ensure that they are referring to the latest available legislation and guidance which can be found at hse.gov.uk, environment-agency.gov.uk, cea.org.uk and many other reliable sources. A list of many of the currently available reference documents is in the Appendix, along with a glossary of terms used.

The Combustion Engineering Association (CEA) is an educational charity which promotes the science of combustion engineering in the commercial and industrial sectors. The CEA is concerned with industry good practice and the safe and efficient operation of combustion related plant and equipment, and offers guidance and accredited training schemes that match the wide range of industrial combustion plant available today.

The CEA also produce a range of Guidance Notes for boiler house designers, installers and users, and these can be obtained through the CEA and are listed on their web site cea.org.uk.

In this document the following words convey specific meaning:

Should: Compliance with this clause is not essential to demonstrate compliance with this document where supported by risk assessment and/or design calculation.

Shall: Compliance with this clause is required in order to claim compliance with this document.

Must: Compliance with this clause is a legal requirement within the United Kingdom.

Unless otherwise stated, all pressures refer to gauge pressure.

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- Thermal Fluid Solutions

Cover image courtesy of Babcock Wanson

THERMAL FLUID - A LIQUID OR VAPOUR USED TO CARRY HEAT
i.e. A 'HEAT TRANSFER MEDIUM'

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1 INTRODUCTION

Thermal fluid heating systems are in common use across many sectors of industry and it is estimated there are at least 2000 installations of such heaters in the UK fired on natural gas and light oil, and many more, often smaller units, utilising direct electrical heating of the fluid. Biomass is also used in some installations as a fuel.

Thermal fluid heaters are available in a wide range of sizes to suit many different applications and temperature requirements. Units capable of delivering fluid temperatures to processes at up to 350°C range from 100kW to around 17MW output, with smaller sizes for providing heat to individual process machines also being readily available. Some systems also include cooling capability to around minus 50°C with the correct choice of fluid.

Users of these installations operate in a wide variety of industries including:

- Food and drink manufacturing, breweries and distilleries;
- Printing and coatings industries;
- Petrochemicals and bitumen reactors;
- Fine chemicals;
- Wood panel and composite panel manufacturing;
- Extrusion and moulding processes;
- Laundries.

This guidance is for users of thermal fluid systems to enable them to fully understand the capabilities of thermal fluid heaters and the way they can be integrated into their business. It will also be useful for designers and installers to remind them of emerging legislation and best practices that affect the installations they create, and it will help plant operators and maintenance contractors to keep the installations operating safely and at optimum efficiency.

There are a number of sets of legislation relating to the design, installation, operation and maintenance of industrial equipment such as thermal fluid heaters and associated systems, and reference is made to the most significant of these throughout the text. A list of suggested reference material is in the Appendix, along with a glossary of some of the terms used herein.



Typical multi-pump thermal fluid installation (Babcock Wanson)