

# Operation and Maintenance Manual

## AFTA Thermal Stores



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# 1 FOREWORD

This manual is a guide for installation, commissioning and maintenance of AFTA thermal stores supplied by Arbe Integrated Engineering Ltd.

It is meant for those who are responsible for the installation, the use and maintenance of the packages. We recommend that you read this manual carefully before commencing any work.

There are three types of thermal stores supplied by Arbe Integrated Engineering

- AFTA Range – Traditional thermal stores with multiple connections to suit various system designs. The AF type of vessels are bespoke to each application

The AFTA range of thermal stores / buffer vessels store hot water for heating purposes that has been heated by an external heating source such as CHP units or boilers, or other heat recovery processes. The AF-PV and AF-RM range have insulation supplied as standard, PLFH high density polyurethane insulation and encased with a high-strength PVC jacket.

Our AFTA range offers capacities between 100 litres and 100,000 litres

The AF range of thermal stores are generally supplied without ancillaries and should be installed as per the instructions supplied within this manual.

# 2 INTRODUCTION

This manual is applicable for AFTA, AFPA & AFSA thermal stores supplied by ARBE INTEGRATED ENGINEERING.

**ARBE INTEGRATED ENGINEERING cannot be held responsible or liable for damage as a result of incorrect installation, use and / or maintenance of ARBE INTEGRATED ENGINEERING thermal stores / buffer vessels as well as not complying with the instructions in this manual.**

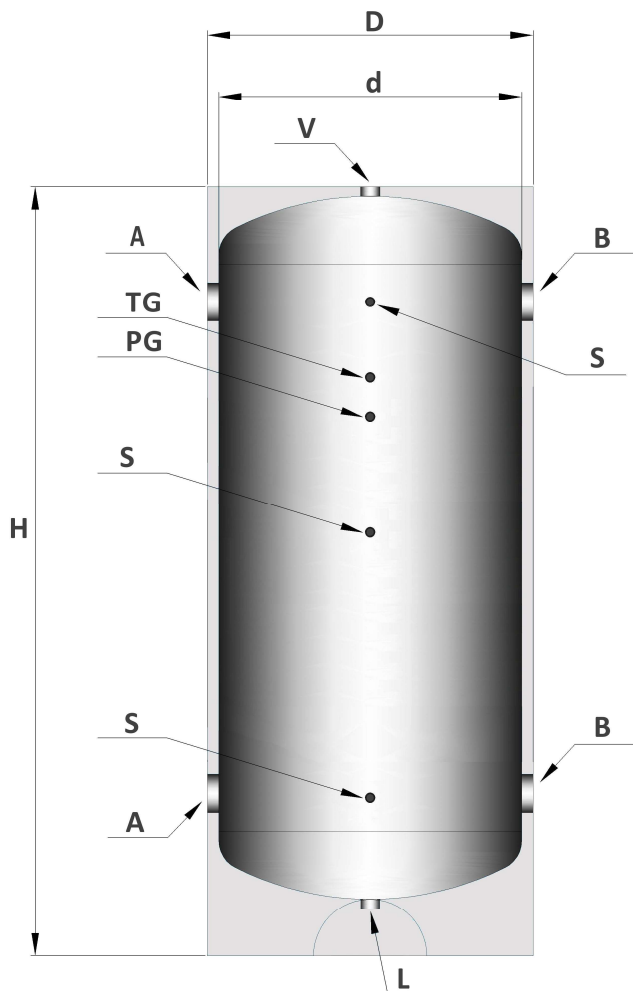
**Please note that our vessels are specially designed and built for the operating conditions (pressures, temperatures, capacities and type of fluids) provided by the customer. Sudden pressure peaks beyond the normal operating pressure (or pressure surges) which can occur during starting up or stopping of the system can severely damage the unit and should be prevented. ARBE INTEGRATED ENGINEERING cannot be held responsible for any damage as a result of any operation deviating from the original design conditions.**

**Supplier:**

**Arbe Integrated Engineering Ltd  
Unit 19, Halifax Industrial Estate  
Marshway, Halifax  
HX1 5RW, UK**

## 2 INTRODUCTION – AFTA & APFA VESSELS

AF Capacity (Litres)	Dimensions & Connection Sizes											
	D	d	H	L	H1	A	B	S	TG	PG	L	V
100	510	400	1000	855	580	1"	1"	½"	½"	½"	1¼"	½"
200	560	450	1400	1240	630	2"	2"	½"	½"	½"	1¼"	½"
300	660	550	1420	1260	730	2"	2"	½"	½"	½"	1¼"	½"
500	760	650	1660	1520	830	DN65	DN65	½"	½"	½"	1¼"	½"
800	910	800	1820	1645	980	DN80	DN80	½"	½"	½"	1¼"	½"
1000	1000	800	2070	1895	980	DN100	DN100	½"	½"	½"	1¼"	½"
1500	1150	950	2450	2295	1180	DN100	DN100	½"	½"	½"	1¼"	½"
2000	1300	1100	2570	2325	1330	DN100	DN100	½"	½"	½"	1¼"	½"
2500	1450	1250	2600	2435	1480	DN100	DN100	½"	½"	½"	1¼"	½"
3000	1450	1250	2800	2635	1480	DN100	DN100	½"	½"	½"	1¼"	½"
3500	1600	1400	2550	2375	1630	DN150	DN150	½"	½"	½"	1¼"	½"
4000	1600	1400	2880	2705	1630	DN150	DN150	½"	½"	½"	1¼"	½"
4500	1800	1600	2650	2475	1830	DN150	DN150	½"	½"	½"	1¼"	½"
5000	1800	1600	2960	2785	1830	DN150	DN150	½"	½"	½"	1¼"	½"
6000	2000	1800	2850	2675	2030	DN150	DN150	½"	½"	½"	1¼"	½"
7000	2000	1800	3250	3075	2030	DN150	DN150	½"	½"	½"	1¼"	½"
8000	2200	2000	3160	2985	2230	DN150	DN150	½"	½"	½"	1¼"	½"
9000	2200	2000	3380	3205	2230	DN150	DN150	½"	½"	½"	1¼"	½"
10000	2400	2200	3180	3005	2430	DN150	DN150	½"	½"	½"	1¼"	½"



## 2 INTRODUCTION – INSULATION

The AFTA range of thermal stores supplied by Arbe are supplied uninsulated or insulated in the factory, depending on the capacity of the vessel and site requirements. Vessels are finished in a Stucco aluminium casing as standard, suitable for internal applications only or with Stucco aluminium or Aluzinc cladding designed for external installation as an option, for applications where the vessel is to be installed externally or a stronger jacket is specified or required.

### AFTA & AFPA - Mineral Wool

We also offer standard 50mm BCO foil-faced mineral wool insulation as an option. Further details can be obtained from our technical department

### 3 HEALTH & SAFETY NOTICES



#### YELLOW TRIANGLE

Refer to applicable SAFETY ALERT notices within the manual!

All SAFETY ALERT notices are applicable to personal injury and identified by the following symbol.



Please be aware of the following potential hazards, which could be present during installation, commissioning, servicing and operation:

- Injury hazard from heavy/sharp objects during installation. Plan and execute the installation with care
- Injury hazard from pressure-containing parts. In general, before working on pipework or other pressure-containing parts, isolate and drain them. Never exceed the maximum working pressure of the unit
- Electrical hazard (If anti-frost immersion heaters fitted). The unit uses mains voltage electricity, either 240v 1 phase or 400v 3 phase. External voltages may be fed to the units which are not isolated by the unit isolator. Equipment on the unit may operate automatically without warning
- Mechanical hazard. The unit may have moving parts. Equipment on the unit may operate automatically without warning
- Scalding hazard. The equipment may contain very hot water at pressure. Surfaces may be hot



The unit must only be worked on by suitably qualified and trained personnel. Checks to ensure electrical safety should be carried out by a competent person.

When doing service work on the package equipment

- Deactivate any pumps and immersion heaters and turn off the power
- Close the shut off valves
- **Fully reduce the pressure in the piping system and allow pipes to completely cool down**



If necessary, disconnect the electrical wires. Before putting the systems back into operation again, make certain that all equipment is fitted correctly and shut off valves re-opened.

- Make the following checks for correct operation.
- With the system hot, examine all water connections for soundness.
- Carry out equipment general checks (see specific equipment section)
- Balance the system.

## 4 UKCA REGULATIONS CERTIFICATE

The standard range of AFTA thermal stores are designed in accordance with the requirements of the UKCA PE(s)R 2016 Regulations. Units classed as SEP in the regulations are not supplied with a UKCA mark.

It is the responsibility of the user and/or installer to ensure that the unit is installed and operated safely, and in accordance with the instructions supplied within this manual. The standard AFTA thermal stores range is designed for a water medium in the shell.

### EC DECLARATION OF CONFORMITY

We

Supplier Name: Arbe Integrated Engineering Ltd  
Address: Unit 19, Halifax Industrial Estate, Halifax  
Country: England

declare, in sole responsibility, that the following equipment

Product: AFTA Thermal Stores  
Country of Origin: England

are in accordance with the requirements of the UKCA PE(s)R 2016 Regulations

Certificate Number: PED-AFTA-23

Date of Issue: January 2023

Applicable Standard: UKCA PE(s)R 2016 - SEP

Subject products are designed, manufactured and tested according to the appropriate quality control procedures

Date: 03/01/23  
Rob Brownless  
Arbe Integrated Engineering


Size (Litres)	Fluid Group	PED Category	Module
All sizes ranging from 200 to 100,000 Litres	Chart 4 Group 2 Liquids	SEP	-

## 5 GENERAL

### 5.1 Identification of the Unit

All thermal stores supplied by ARBE INTEGRATED ENGINEERING are provided with a name plate. On this plate the following details are specified:

- Serial number
- Test date
- Model
- Capacity
- Design pressure
- Test pressure
- Design temperature
- Applicable standard

STORAGE CYLINDERS AND BUFFER VESSELS			
Serial No.	<input type="text"/>	Test Date	<input type="text"/>
Model	<input type="text"/>	Capacity (Litres)	<input type="text"/>
Design Pressure (BarG)	<input type="text"/>		
Test Pressure (BarG)	<input type="text"/>		
Design Temp. (°C)	<input type="text"/>		
Applicable Standard	<input type="text"/>		
		www.arbe.co.uk Email: mail@arbe.co.uk Tel. 01422 646865	



## 5 GENERAL

### 5.2 Lifting & Handling



Use lifting lugs where fitted. Do not lift a vessel using the insulation where fitted. Straps may crush or damage the insulation casing. Due to the insulation casing material thickness, care should be taken when moving and handling the vessel not to damage the insulation. Do not lift the vessel using chains directly in contact with the shell. Do not allow operatives to stand on the vessel

### 5.3 Siting & Assembly

Unless specifically ordered for an external installation, the vessel must be sited indoors. Foundations or plinths must be firm and level to prevent settling, pipe strain or distortion of the shell. Unless specifically ordered differently, the vessel must be installed in a level position.



**On sectional cylinders, the bolting of sections must be carried out in a diametrically-opposite sequence to ensure even tightening of the bolting. Should the cylinders ever need to be dismantled, a new set of body gaskets would be recommended to be used to ensure sealing**

Protective covers and plugs may be fitted to connections to protect them in transit. These must be removed prior to use. If a connection is not required, seal it appropriately. Check for any foreign material which may have got into the vessel. Pipework connected to the vessel must be adequately supported to prevent any loads being transmitted to the vessel.

Provide for thermal expansion with bends and expansion joints. Fit isolation valves prior to the vessel connections to facilitate servicing (NOT TO THE VENT). For flanged connections, tighten bolts in a diametrically opposite sequence to load the flanges evenly onto the gasket. Ensure adequate venting for air removal during filling and operation (pressurised systems should have an automatic air vent and a manual air vent for this). Safety valves should have their discharge pipes away to a safe disposal point, preferably via an air-break and tundish so that the discharge unrestricted and easily visible.

In unvented or closed systems, water expansion must be accommodated by a separate expansion vessel fitted in the system on the cold feed line. We would recommend the use of a pressurisation unit on large systems, especially systems with high operating temperatures above 100°C where the possibility of steam flashing can occur due to pressure loss in the system

**With reference to the fixing down of the unit, please note that the legs or brackets SHOULD NOT be welded to a base plate or structure and should always be fixed down using brackets and bolts. Any modification to any part of the package where welding or brazing has been carried out may invalidate the warranty of the unit (please refer to the warranty section of the manual**

# 6 COMMISSIONING AND OPERATION

## 6.1 Commissioning & Operation

Do not operate the equipment at pressures or temperatures in excess of those specified on the nameplate or the vessel marking. Do not subject the vessel to conditions of vacuum or partial vacuum. For example, partial vacuum may occur if draining the vessel when valves fully or partially closed.

1. It is assumed that the pipework is already full of water
2. Start with all valves closed and circulation pumps off
3. Close the drain valve
4. Ensure the automatic air vent is operational
5. Open any manual vent valves
6. Open the main system connection valve and slowly fill the vessel with water
7. Shut the manual vent valve when water appears from it
8. Carefully open all the other system connections valves

Check that all gaskets are effective when the unit is operating - some bolt tightening may be necessary after the unit has been first heated and subsequently from time to time. Following installation and commissioning it is advisable to remove, clean and re-assemble any strainers.



All fluids must be drained when the unit is out of operation to prevent freezing or possible corrosion.



**Warning:** to avoid any “water hammering”, open the valves gradually; sudden accelerations of fluid could cause increases in pressure many times greater than the working pressure.

## 6.2 Maintenance

The AF range of thermal stores are designed to operate efficiently with a minimum of attention. A regular maintenance programme will ensure continued high operating efficiency and trouble-free operation.



Always disconnect the power supply before carrying out any maintenance on the unit

### Expansion Vessel

- Biannually check the pre-charge pressure of the expansion vessel; the same value established during the system installation must be always maintained
- Restore the air cushion to the initial valued in order to ensure an efficient protection of the installation from overpressure

## 6.3 Draining the Cylinder

### GENERAL POINTS :-

It is recommended that a set of gaskets for the heater battery be carried for use when the unit is stripped down for insurance inspection, or cleaning

Maintenance of the destratification pump and other ancillary equipment should be carried out in accordance with the instructions supplied for these items by their respective manufacturers. Copies of these are included with these instructions

### To drain the cylinder down

1. Obtain a complete set of replacement gaskets from Arbe Integrated Engineering
2. It is assumed here that all isolation valves (except drain) are open at the start
3. Switch off any system circulating pumps and isolate any immersion heaters
4. For closed systems reduce the residual cylinder pressure by manually operating the safety valve - some hot water will come out!
5. For closed systems open a manual vent valve to allow air in during drain-down



**It is imperative that if the unit has been installed with an anti-vacuum valve, this should be checked to be operational whilst starting to drain down to avoid and vacuuming within the vessel which would cause catastrophic failure of the shell**

## 9 WARRANTY

Further to conditions contained within our standard terms and conditions of sales, please see below the warranty details for the range of AF thermal stores

### 9.1 Warranty

Arbe Integrated Engineering guarantees its products according to EU Regulations, on condition that all the installation, operational and maintenance requirements are adhered to and carried out, and that all technical specifications indicated by us are complied with.



The duration of the warranty shall start from either:

- The date of delivery should the package not be commissioned by a qualified engineer carried out by Arbe Integrated Engineering.
- The date of commissioning and hand-over to the customer should the package be commissioned by Arbe Integrated Engineering.

Any modifications or changes made to the cylinder shall invalidate any warranty or guarantee should this not be approved in writing from Arbe Integrated Engineering.

The warranty shall cease on the unit in the event the following points are not complied with:

- Any part of the cylinder is modified or altered without prior written consent of Arbe Integrated Engineering.
- Items on the vessel such as the drain pipe support are removed.
- Welding of the vessel legs to a base. The vessel should be bracketed and bolted.
- There is a non-compliant installation within the system such as isolating valves on vent valves and inadequate expansion control and valving on closed systems.
- The design parameters of the package are exceeded, such as pressure & temperature.

Please note that any issues with the package caused by poor water quality is not covered with this warranty, including:

- Scaling or blockages in hard water areas.
- Damage to the cylinder and associated equipment from additives such as chlorine dioxide.
- Debris within the water as on unfiltered borehole water systems etc.