

Operation and Maintenance Manual

AD Direct Storage Cylinders



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1 FOREWORD

This manual is a guide for installation, commissioning and maintenance of AD range of direct storage cylinders 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.

The AD range of cylinders store potable hot water that has been heated directly by an immersion heater, or externally from a heat source such as a plate heat exchanger or heat pump. The insulation supplied as standard is polyurethane foam insulation on cylinders up to 1000 litre capacity and PLFH foam insulation and encased with a high-strength PVC jacket.

The standard range offers capacities between 200 litres and 5000 litres.

The AD range of cylinders are generally supplied with an unvented kit and P/T safety valve that should be installed as per the instructions supplied within this manual.

2 INTRODUCTION

This manual is applicable for AD direct storage cylinders 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 direct storage cylinders 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.

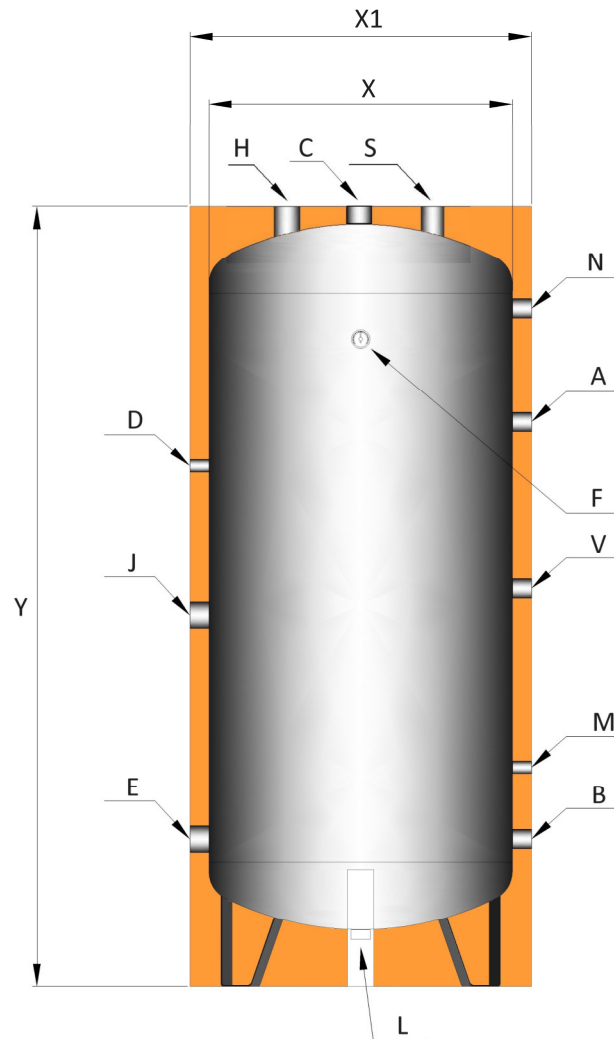
2 INTRODUCTION

Dimensions		ADX Capacity (Litres)										
		200	300	500	800	1000	1500	2000	2500	3000	4000	5000
X1	mm	550	650	750	1000	1000	1200	1400	1300	1350	1500	1700
X	mm	450	550	650	800	800	1000	1200	1200	1250	1400	1600
Y	mm	1510	1550	1840	1960	2210	2250	2170	2600	2800	2880	2970
Y1	mm	660	760	860	1100	1100	1360	1550	1510	1550	1700	1800
Z	mm	1400	1450	1730	1930	2180	2170	2110	2500	2700	2800	2850
A	mm	1½"	1½"	1½"	2"	2"	2"	2"	2"	2"	2"	2"
B	mm	1½"	1½"	1½"	2"	2"	2"	2"	2"	2"	2"	2"
C	BSP	1½"	1½"	1½"	2"	2"	2½"	2½"	3"	3"	3"	3"
D	BSP	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"
E	BSP	1½"	1½"	1½"	2"	2"	2½"	2½"	3"	3"	3"	3"
F	BSP	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
H	BSP	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
J	BSP	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"
M	BSP	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
N	BSP	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
S	BSP	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"
V	BSP	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"
Energy Efficiency Class	Rating	B	B	C	C	C	C	C	-	-	-	-
	W	55	68	93	115	128	153	176	-	-	-	-

AD Design Details		
Characteristics	Standard	Optional
Tank Capacity	200 - 5000 Litre	
Arrangement	Vertical	Horizontal
Tank Material	Stainless Steel 316L, Enamelled Steel, Galvanised Steel or Copper-Lined Steel	
Insulation	Polyurethane Foam or PLFH High Density Insulation & Cladding	Mineral Wool & Stucco Cladding
Accessories	Standard	Optional
	Thermometer	Unvented Kit & Safety Valve
	Drain Valve	Immersion Heater
	Anode(s) (ADG & ADZ)	Anode(s) (ADX & ADC)
Design Code		
European Pressure Equipment Directive 2014/68/CE Art 4.3		

AD Design Details		
Model	Maximum Temperature	Maximum Pressure
ADX, ADG & ADZ	99°C	6 BarG (Optional up to 10 BarG)
ADC	110°C	16 BarG

2 INTRODUCTION



Connections

A	Primary Inlet	J	Immersion Heater
B	Primary Outlet	L	Drain
C	Secondary Flow	M	Control Sensor
D	Secondary Return	N	High Limit Thermostat
E	Cold Feed	R	De-Stratification Pump
F	Thermometer	S	Anti-Vacuum Valve (Optional)
G	Pressure Gauge	V	Anode(s)

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. 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 has 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 the pumps 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 PRESSURE EQUIPMENT DIRECTIVE CERTIFICATE

The standard range of AD direct storage cylinders are designed in accordance with the requirements of the Pressure Equipment Directive 2014/68/CE. Units classed as SEP in the PED category are not supplied with a CE mark. Units in category I & II are CE marked and appropriate markings and certification is supplied with each unit.

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 range of AD direct storage cylinders are 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, Marshway, Halifax, HX1 5RW
Country: England

declare, in sole responsibility, that the following equipment

Product: AD Direct Storage Cylinders
Country of Origin: Italy

are in accordance with the requirements of the Pressure Equipment Directive 2014/68/CE

Certificate Number: PED-AD-20
Date of Issue: March 2020

Applicable Standards: 2014/68/CE Art. 4.3 (SEP)

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

Date: 01/03/20
Rob Brownless
Arbe Integrated Engineering


Size (Litres)	Fluid Group	PED Category	Module
All sizes ranging from 200 to 5000 Litres	Chart 4 Group 2 Liquids	SEP – Shell	A

5 GENERAL

5.1 Identification of the Unit

All direct storage cylinders 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

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.

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 systems, water expansion must be accommodated by a separate expansion vessel fitted in the system on the cold feed line.

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

The vessel should be installed & commissioned by a fully qualified engineer, trained in such products.



Do not operate the cylinder at pressures or temperatures in excess of those specified on the nameplate of the vessel marking. The cylinder also should not be subjected to conditions of vacuum or partial vacuum. Should the package be installed on or above the 3rd floor of a building, then an anti-vacuum valve should be fitted immediately within the secondary hot water pipework prior to any isolating valve, and it must not be removed. For example, partial vacuum can be caused if the cold feed or the vent are restricted during draw off or drain down. This has more significance the higher within a building the unit is installed.

1. Fully fill the secondary pipework & system with water
2. For unvented systems it is assumed here that any cold water booster set and/or pressure reducing valve is already commissioned and set to the correct pressure
3. Start with secondary flow, return and cold feed valves closed and secondary re-circulation pumps off
4. Close the drain valve
5. For unvented systems ensure any auto-air vents are operational
6. For unvented systems open manual vent valves
7. For unvented systems open expansion vessel isolation valve
8. Open the cold feed valve and slowly fill the cylinder with cold water
9. For unvented systems when water reaches the manual vent valve, close it
10. If the cylinder is open vented and shares a vent with other units, connect it to the common vent using the 3-way valve
11. Carefully open the secondary flow and return valves
12. Switch secondary re-circulation pumps' power on

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 StorPlate package is 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 plate heat exchanger be carried for use when the unit is stripped down for insurance inspection, or cleaning

Maintenance of the 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

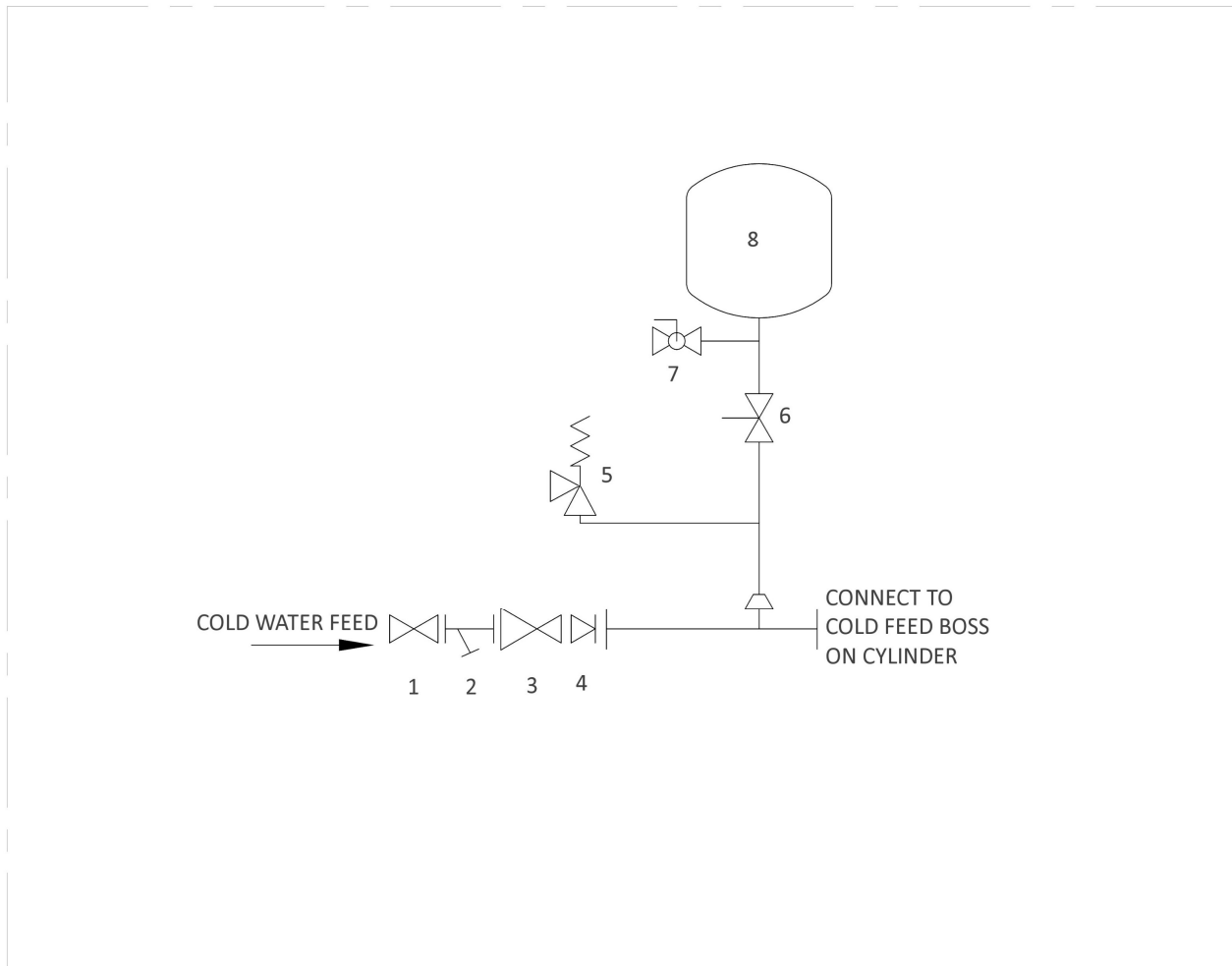
To drain the cylinder down (secondary side)

1. Obtain a complete set of replacement gaskets from Arbe Integrated Engineering (for the inspection opening, if fitted)
2. It is assumed here that all isolation valves (except drain) are open at the start
3. Isolate the primary fluid inlet and outlet - switch off primary pump and boilers if necessary
4. Switch off secondary system return pump and isolate secondary return to cylinder
5. Isolate the secondary flow
6. Isolate the cold feed
7. For unvented systems reduce the residual cylinder pressure by manually operating the safety valve - some hot water will come out
8. For unvented 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

6.4 Installation in an Unvented System



Key

- 1 Isolating Valve
- 2 Strainer
- 3 Pressure Reducing Valve
- 4 Non-Return Valve
- 5 Expansion Safety Valve
- 6 Expansion Isolating Valve (Lockshield)
- 7 Expansion Drain Valve
- 8 Expansion Vessel

The above layout is the standard recommended cold feed kit available with our AD cylinders for unvented systems, complying with Building Regulations. The size of each cold feed and kit expansion vessel is project specific so please contact us with any queries on sizing or the kit that is required.



The safety valve(s) should be installed on the secondary outlet, as close as possible to the connection on the vessel. Any isolating valves should be installed after the safety valve connection to ensure the safety valve is not isolatable from the vessel

9 WARRANTY

Further to conditions contained within our standard terms and conditions of sales, please see below the warranty details for the range of AD direct storage cylinders

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 vessels and valving on unvented 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.