Temporary Steam and Hot Water Boiler Plant
Guidance for Safe Installation and Use

Ref: BG08

CEA
Combustion Engineering Association

Guidance for Safe Installation and Use of Temporary
Steam and Hot Water Boiler Plant (Ref: BG08)

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1 FOREWORD

Temporary Steam and Hot Water Boiler Plant - Guidance for Safe Installation and Use (Ref: BG08) Second Edition is a guidance document intended to provide advice to all those involved in the design, procurement, manufacture, supply, installation and use of temporary steam and hot water boiler installations. It is applicable to all temporary installations of boilers and addresses the following issues:

- The Legal and Regulatory framework, ownership and responsibilities;
- The Specification and Design of temporary boiler installations;
- Temporary boiler installation guidance and best practice;
- Operation and maintenance of the temporary plant;
- The decommissioning and return of the plant.

THE FOLLOWING WORDS CONVEY SPECIFIC MEANING:

Should: Compliance with this clause is not essential 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.

1.1 About this guide

This comprehensive guide deals with all aspects of designing, procuring, installing and operating a temporary steam or hot water boiler installation. We trust that by studying the contents and following this advice your temporary boiler plant will operate safely and more efficiently, and provide you with a trouble-free system. If in any doubt, contact the relevant supplier, the system designer, or your Competent Person for advice.

It is produced in order to assist the Owner, Operator, Engineer and Manager of the boiler plant to help them understand all aspects that affect the use of temporary boilers, both from a practical operational performance view and for the legal requirements, as well as for the owner of the boiler, the Hire Company.

It covers who is responsible for the design and creation of the temporary installation, the safe installation of the boiler plant, and who is responsible for managing the safe and efficient operation of this type of equipment. Ultimately the responsibility lies with the most senior person on a site; however, they can delegate the responsibility for daily operations, but only to a suitably trained and competent person on the site.

Within this Guide there are a significant number of legal requirements, regulations and standards highlighted; these regulations and standards are periodically reviewed and they can and do change, but they are as accurate as possible at the time of publication. Users should ensure they are referring to the latest edition of published guidance and Approved Codes of Practice, available from gov.uk, hse.gov.uk, the Environment Agency, safed.co.uk, igem.org.uk etc.

The CEA cannot accept any liability for the information provided herein; however, be assured that we have consulted widely with our member companies and other partners during the revision of this guide. This publication should not be regarded as an authoritative interpretation of the law, nor a mandatory legal requirement. However, if the guidance provided is followed, it will normally be regarded as sufficient to comply with the relevant health and safety duties.

Containerised boiler

1.2 Acknowledgments

The Combustion Engineering Association is an educational charity with the objective of giving advice to plant engineers on the design, manufacture, operation and maintenance of a wide variety of combustion processes and associated activities. This guide has been compiled and subsequently revised from the combined experience of a number of CEA Members and partners, and special thanks go to:

- ADT Flexibles
- British Engineering Services
- Byworth Boiler Hire
- Carrier Rental Services
- Coal Hill Associates
- Cochran Ltd
- Combustion Engineering Association (CEA)
- Deep Water Blue
- Energy and Environmental Solutions
- Kings Boiler Hire

2 SCOPE

This guidance applies to all steam and hot water boilers supplied and installed as temporary plant on a site to replace or supplement existing steam or hot water capacity. It includes guidance on design, procurement, supply, installation, operation and maintenance of all temporary boiler plants.

Readers are directed towards BG01, *Guidance on Safe Operation of Steam Boilers*, and BG02, *Guidance on Safe Operation of Hot Water Boilers*, both published jointly by the CEA and SAFed, and HSE INDG436, *Safe management of industrial steam and hot water boilers*. These contain guidance that is relevant to all steam and hot water boiler installations, including those of a temporary nature.

INDG 436 - Background:

As the manager of a workplace, you have a duty to manage the risks associated with that workplace. If there is a boiler installation on your premises, you must ensure it remains safe.

3 INTRODUCTION

At some time in their life most installations of steam and hot water boilers will require a maintenance outage or a significant replacement. Sometimes this is frequent, often planned, such as for the annual inspection of a steam boiler, and sometimes it is a relatively rare occurrence where boilers are well managed and the capacity available on site is sufficient to cover for shutdowns and outages, and only a total replacement or sudden unexpected failure may need a temporary installation.

Suppliers of temporary boilers routinely receive both urgent and routine requests for stand-by plant, and there is a thriving industry in the UK to respond to customers' needs. It is estimated that there are approximately 600 mobile boilers in the UK, with around 80% on site at any one time, and with rental periods ranging from a few weeks to a year or more in some cases.

Many sites have a well-practised routine for having temporary plant on site, and the ideal situation where this is a known activity is to have a full set of correctly sized connection points available to which the temporary plant can be easily attached. This is the default position, and many of the problems that arise every year from the installation of temporary boilers can be reduced or eliminated by providing permanent connection points and suitable locations for the temporary plant.

However, some sites have not been designed with temporary plant in mind, or there are other restrictions which can make the temporary installation much more challenging, and the guidance herein is intended to help customers achieve a safe and secure solution to a temporary problem.

All of the relevant legislation and much of the available guidance on this subject will apply just as much to the temporary installation as to a permanent one; in addition, there are some significant new issues that must be considered to ensure that the temporary installation is safe.

A Boiler House Technical Risk Assessment on your existing plant should have already identified:

- Whether hiring temporary boilers at some time in the future is a possibility;
- If it is, the facilities and procedures needed for the safe and successful design and installation of the temporary plant have been considered and documented;
- The additional issues that might arise should temporary plant be needed have been considered and resolved;
- A clear plan for the eventuality of hiring in boilers is documented, discussed with all stakeholders, and regularly reviewed for suitability;
- A Boiler Water Treatment Risk Assessment in accordance with BG04 is in place for any existing boiler plant and any hire boiler plant; refer to BG04 for further information.

The more effort that is put into the creation of suitable and sufficient risk assessments before the event, the greater the safety and success of the temporary installation when that day arrives.

Companies that hire out boilers will offer a range of possible solutions to customers, the simplest and most routine being the delivery and collection of a boiler that the customer requires to meet pressure and volume specifications for steam or hot water. These mobile systems will be serviced, currently certificated under PSSR, well maintained, and equipped for the role they have to perform, but they are only one part of the equation.

The **responsibilities of the boiler owner** (the hirer) usually include:

- holding a Written Scheme of Examination (WSE) as appropriate for each boiler;
- PSSR inspections and non-destructive testing (NDT) in accordance with the WSE;
- Record keeping for PSSR and boiler repairs;
- Standing instructions and emergency instructions for the safe operation and maintenance of the boiler by the customer/user;
- Providing suitably sized and adequately tested flexible hoses and other plant items in accordance with the hire contract details;
- Routine service work for long term hires;
- Arranging transportation, and oversized load movement notification if necessary.

The **responsibilities of the boiler user** (the site management) for all other aspects of the temporary installation include:

- the correct specification of the hired equipment to meet the system demand and characteristics (system pressure v. boiler pressure, pressure relief and other protection);
- the design of the interconnections between the hired boiler and the system;
- the correct installation of the interconnecting pipework, cables and other components;
- the commissioning of the temporary installation including first fill of water, salt, fuel, chemical dosing, etc.;
- liaison with their Competent Person under PSSR, with all necessary inspections completed;
- operation and maintenance of the hired asset in accordance with the hirer's requirements, including keeping of all records of operation;
- safety and environmental compliance in operation;
- decommissioning and return of the hired boiler in good condition, well maintained, empty of all fluids, and complete with all attachments and other hired in equipment.

General advice is that boilers scheduled to be on site for less than one year could be installed as temporary plant with flexible connections, but for any longer than one year a permanent, solidly piped installation is recommended.

4 DESIGN AND INSTALLATION OF TEMPORARY BOILER PLANT

The following paragraphs contain useful advice for designers of temporary steam and hot water systems.

4.1 Transport and Access

Most of the hire plant available in the UK comes on standard articulated trailers or in containers, but some of the larger capacity units are housed in oversized loads that need to be notified to the Highways Authorities and Local Councils. Notifiable loads require a minimum of 2 day notice period prior to movement, and might contain timing and other restrictions depending on the route and the size/weight of the load.

Boilers on trailers and in containers can be large vehicles, and access to the site may need to be considered. The access route must be free of obstructions, including overhead, and if heavy goods vehicles do not normally use that route it would be wise to advise the Police and neighbours. Adequate space is required for turning a large vehicle to avoid complicated and potentially dangerous reversing manoeuvres.

If, in exceptional circumstances, the boiler has to be lifted on to or off the site, crane operations will add a layer of complexity that should be fully addressed in advance of any such deployments.

For larger installations, flexible hoses, fuel tanks and other accessories will require separate transport, and facilities provided by the customer for offloading.

4.2 Location

Boilers on trailers should be located as close as possible to the existing steam or hot water system where possible, but once filled with water they are very heavy and may rely on 6 or 8 point loads (wheels and legs). Ground conditions must therefore be suitable for supporting a unit with a flooded boiler weighing up to 80 tonnes in some cases, and the surface must be relatively smooth and level to ensure the trailer can be accurately levelled on delivery. A survey of below ground services and structures may be required to prevent any damage occurring.

Images courtesy of Byworth Boiler Hire

Any existing boiler houses that have equipment below ground level or significantly higher than ground level should be assessed by a hire company and their advice followed.

Flues and chimneys from mobile boilers will generally be short and fixed to the container, so consideration of the safety and environmental effects of the release of products of combustion must be addressed. Safety vents and relief pipes may need similar attention. Emissions legislation and potential noise issues will need to be considered – see later paragraphs.

The location of the hired boiler and all the interconnecting services in relation to personnel must be carefully considered. It is not acceptable to run temporary pipework through doorways or along corridors for example, and the risk of creating trip hazards, chances of burns and scalds, and, in the extreme, exposure to fractured pipes and joints must all be taken into account when selecting the location for the boiler and all the connected services.

The relative positions of header connections and boiler outlets must be considered, especially where this might create a new 'work at height' risk for installation or operation.

4.3 Steam connections

The primary consideration for the installation of a mobile steam boiler will be the size, route and method of connecting the steam to the site system. Temporary steel pipework will be the best and safest option, with the pipework being:

- Sized for the duty, with appropriate materials selected for the pipework and any joints;
- Valved for safe connection, disconnection and maintenance, with a minimum of double block, spade, bleed and vent at main connection points;
- Trapped and drained at suitable intervals, especially for vertical risers;
- Laid to a fall and adequately supported, especially vertical runs;
- Designed to allow for expansion and contraction as the system is brought into and out of service;
- Fitted with pressure reducing sets and appropriate safety relief valves where pressure differences are anticipated. Users should not alter the safety valve set pressure or working pressure of the temporary boiler to match the installed system;
- Lagged for personnel protection and energy efficiency.

Pressure reducing set under construction.

Image courtesy of Byworth Boiler Hire

4.4 Flexible hoses

A length of flexible hose may be used to make final connections to systems, and boiler hire companies frequently offer these as optional extras. Alternatively, sites who hire boilers regularly may purchase their own. The most common types of flexible hose used with temporary boiler plants are stainless steel corrugated tube types with a stainless steel 'over braid' or spiral protector along the whole length.

Flexible hose protection
Image courtesy of ADT Flexibles.

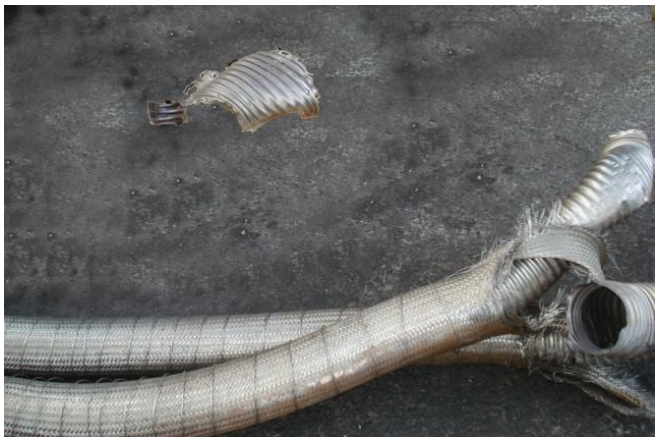
A wide range of sizes and flange connections can be specified. Braiding may be double layer or triple layer according to the desired specification, and an overall cover such as Procoil or Flat Guard will give additional external protection and help to extend hose life.

Flexible hoses are generally specified with significantly greater capability (pressure and temperature) than required, and it is rarely the hose that fails but the joint at the flange or damaged surface braiding that forms a weak point, and these failures are invariably due to incorrect installation or poor hose handling techniques.

It is normal practice to supply hoses for steam and hot water connections manufactured to BS EN ISO 10380:2012 which includes clauses for the flex life of the hose, derating factors for elevated temperature, and a testing statement. Hoses for fuel or water connections may be to a different specification according to the contents of the pipework and the pressure/temperature required.

Stainless steel hoses specified at 20ºC will have a derating factor of up to 50% in some cases when operating at 300ºC, as an example. Derating charts should be consulted.

Very badly damaged protective braid and steam hose deformed



A burst flexible steam hose due to poor customer installation

Hoses may be ‘colour coded’ to indicate the usual duty for which they have been selected and tested. Coloured end flanges or bands of sheathing may be used, in a manner similar to fixed pipeline labelling, yellow for gas, brown for oil, blue for water etc. Hoses should also be uniquely tagged for testing and quality control purposes, and a detailed record of serial numbers and hose usage kept by the hirer or owner of the hoses.

Flexible hoses need to be carefully selected, installed and maintained, and the minimum number of flexible hoses and joints that can be used for the installation is recommended. Flexible hoses should only be used for short term hire periods and for final single hose connection if necessary to connect to the customer’s fixed pipework.

If flexible steam hoses are used, they must be suitably arranged so that they are as straight as possible and there is a natural fall from the boiler crown valve to the client’s system. Flexible steam hoses must be suitably trapped and drained at the lowest level to guard against water hammer, and must be run in a safe area, suitably secured, and cordoned off from personnel and traffic. All flexible connections should be in a ‘relaxed’ state prior to final tightening to avoid any torsion twist that may lead to premature failure.

A system of adjustable legs to support short runs of flexible hoses is recommended, and the hirer may be able to provide these if required. Other solid non-combustible supports may be suitable for short pipe runs in a temporary situation.

Flexible hose supports
Image courtesy of Byworth Boiler Hire

Flexible hoses that are run underneath trailered boilers have been known to fail due to leakages from the unit above, especially with drips from brine and water treatment chemicals. Outer casings of flexible hoses may quickly discolour and potentially fail.

Hoses need to be tested before first use and routinely thereafter. Typically all hoses will be hydrostatically tested to 1.5x max working pressure as standard immediately following manufacture. Any hydrostatic re-test is normally carried out at working pressure as determined by risk assessment.

Table 1 – Flexible Hose recommendations

	Good practice	Unacceptable practices
Hose selection	• Short straight lengths • Flanged bolted connections • Pressure and temperature rating well above application requirement (pressure rating reduces as temperature rises) • Additional external protection fitted • Stainless steel used for all 'wetted' parts that are in contact with the product conveyed • Materials suitable for the intended fluid – WRAS approved for potable water • Larger diameters usually lead to shorter hoses for handling and transport • Colour coded and serial numbered	• Excessive multiple lengths and connections • Un-braided or unprotected hoses • Using steam and oil hoses in domestic hot water installations (dhw) – dhw hoses to be segregated, and cleaned before use
Handling	• Heavy hoses will need 'risk assessed' handling techniques • Appropriate PPE • Care putting hands inside hoses (sharp edges may be present) • Supported along their length	• Dragging hoses along the ground • Hanging hoses from slings or fork lift trucks by their flanges • Tight bends or folding the hose • Standing on hoses
Hose installation	• Fully supported and off the ground on purpose made supports • Well supported where vertical • No 'droops' or 'sags' in steam hoses where condensate might collect • 'Pro-coils' or other protective surround fitted if adverse environments • Laid to fall to a trap set • Personnel protection – use barriers • Distortion free assembly avoiding tight bends and torsion twist • Prevented from buckling using proprietary bends and flanges • Free space and support for hose to flex as designed • Consider fitting of restraints to control any 'whip' • Vibration effects considered	• Insufficient or inappropriate supports • Steam hoses not 'trapped' • Vertical hoses hung from flanges • Twisted or distorted hoses • Incorrect bending radius • Laid in corrosive environment (acids or fuels etc.) • Laid across sharp edges or in tight spaces • Laid where personnel can trip or be burned • Laid to tight radii where hoses can 'set' and fail on straightening • Laid in a location where water can pool around the hose

Inspection and maintenance	• Weekly user inspection of hoses and connections, condition of braiding etc. • Tagged, or engraved on flanges, for stock control/unique ID register – date of manufacture, working pressure (WP) @ 20°C, unique ID • Visually inspected by supplier or owner after every use, or quarterly as minimum	
Testing	• Tested after manufacture to 1.5 x WP with test certificates provided • Tested by hirer to WP after every use (visual and air/water test) • Inspected annually by CP • Replaced as determined by risk assessment • Return to manufacturer for re-test if in doubt	

4.5 Hot Water connections

Hot water connections to mobile boilers will have similar requirements as for steam connections. Permanent flanged steel pipework is preferred, but flexible hoses are often used for short term deployments. All the elements discussed in table 1 above are relevant with the exception of trapping and drainage, and avoiding droops in the line since the hoses will be flooded in operation; however, support still needs to be provided along the whole length of the hose.

Hoses used for potable and domestic hot water installations must be to WRAS approved standards.

4.6 Water Quality and Water Treatment Parameters

Many hire boilers are required on site because the fixed boiler has been declared unfit to operate due to scale build up or other water quality related damage. Poor quality water can destroy a boiler in a matter of days in very adverse conditions.

It is essential that both the incoming water quality and water treatment regime for the site's normal plant are advised to the hire company and that the customer's water treatment specialists give correct advice for the use of the hire boiler, in accordance with BG04. If the site uses advanced pre-treatment methods such as reverse osmosis, it may be necessary to extend the treated water supply to the hire boiler as well, and in turn this may negate the use of the hire boiler hot well or softener but might increase the complexity of interconnections.

Water quality on site needs careful consideration. The guidance in CEA BG04 will be found to be useful. If the boiler that is to be replaced has suffered water quality related damage, the supply of correctly treated water to the hire boiler is a clear priority. Even if the boiler being temporarily replaced is in good order, care must be taken to check that the water supply to the hired unit is suitable. As a minimum, checks should be made as follows:

- Is the water supply for the hire boiler a 'known quantity' – is there a suitable raw water analysis available – the water for the hire boiler might be from a completely different source to that used in the fixed boiler plant;
- Will the site condensate be returned to the hire boiler or is this impractical - what percentage of feed water will be available from condensate;
- Is the provision of a softener on the hire boiler skid sufficient, or will the hire boiler need additional water treatment equipment;
- Is there sufficient raw water volume and pressure available.

Hire boilers usually come fitted with a duplex base exchange softener, and it is the customer's responsibility to make sure that this works correctly at all times, is kept full of salt, and any operational discrepancies are advised immediately to the hire company.

The condition of the water in a hire boiler must be monitored by a trained and competent person, in accordance with BG04, on a daily basis. The results of the daily water treatment checks shall be recorded and supplied to the hire company on request. Hire companies will require the boiler user to return water treatment log sheets on a regular basis and failure may leave the user liable to contractual penalties should the boiler be damaged due to negligence attributed to poor or incorrect water treatment and monitoring.

Hire boilers returned to the hire company with significant amounts of scale or other signs of water quality damage will result in expensive claims for repairs. It is worth remembering that the reason a hire boiler is required may well be related to water quality or an associated issue, and repeating the error on a hire boiler could be expensive.

4.7 Water supply connections

Small bore temporary cold water supplies can usually be supplied through appropriately sized PE pipework that is suitably supported, and protected from frost along its length if necessary. Pipework suitable for high temperature product (around 90^{o}C max) will be required if the site hot well is utilised instead of the unit supplied with the hire boiler. Stainless steel braided and protected hoses as in Table 1 are preferred in this case.

The water supply to the hire boiler should be suitable and sufficient in terms of volume flow and pressure – typical pressure requirements are between 3 and 6bar, as specified by the boiler supplier.

If the hot well with the temporary boiler is by-passed because it is expedient to use the hot well already on site, careful consideration must be given to the head of water at the feed pump inlet and the capacity of the feed water pipework from the hot well to the boiler. Feed pumps on hire boilers may well be mounted higher than ground level pumps in adjacent boiler houses.

4.8 Condensate

Short term steam boiler hires on sites with low levels of condensate return might not need to return condensate if the small amounts arising can be safely drained away, but in the majority of cases it will be better to make provision for the condensate to be returned to the hot well on the trailer or in the boiler house.

The effects of whether the condensate is returned to the hot well or not may alter the water treatment regime, so a detailed assessment and monitoring of the water to be delivered to the boiler may be required. The temperature of the condensate and resulting feed water must not be so high as to induce cavitation in feed pumps, and there is the risk of overheating the hire boiler hot well if the site system has passing steam traps.

Flexible high temperature pipework can be utilised for condensate, adequately supported and protected, and fitted with frost protection if the hire boiler is not a 24 hour operation. If braided stainless steel hoses are used for this duty, the relevant sections of Table 1 should be followed.

The condensate return water should be analysed on a daily basis in accordance with BG04, especially where adverse operating conditions might be encountered, or known potential condensate contaminants might cause damage to boilers and ancillary equipment.

4.9 Blowdown and drainage

Hire boilers are usually provided with a small blowdown vessel, but it is important to make sure that this is adequately sized for the intended duty and that it can be connected to a suitable drainage point; blowdown effluent must not be sent to the public sewer at greater than 43ºC.

Blowdown drain pipework needs to be correctly sized, especially if there are long runs to local drains. Lengths of flexible hoses may be suitable, but all the rules above in Table 1 still apply in relation to selection, handling, installation and testing.

Rubber blowdown hose is frequently supplied in an appropriate size, and this is only suitable for blowdown water.

According to local requirements, it may be suitable to pipe blowdown away from the trailer or container to a suitable drain or run off area, and barriers should be provided to prevent trip hazards and protect personnel from injury and the hose from being damaged.

4.10 Electrical supply

A suitable connection point for the electrical power and controls on the trailer needs to be provided, so ready access to a local adequately rated electrical distribution point is essential; hire companies will advise the electrical power requirements. Connection by armoured cable will normally be sufficient, adequately supported and sized for the expected duty.

A 5-pin 3 phase connection plug is usually supplied with the boiler control panel, or flying leads may be specified as an alternative. Once connected, the phases may need changing on the incoming supply to ensure correct direction of rotation of motors. Every part of the electrical installation interconnection must be tested by a competent electrician in accordance with the IET Wiring Regulations Inspection and Test requirements, and suitable test certificates provided to the hire company.

It is important to ensure the continuity of earthing of temporary installations, and consideration must be given to cross bonding any flexible hose joints and especially gas pipework connections to meet current electrical installation regulations and gas safety rules. The bolting of flexible hose flanges will usually provide a suitable earth path for the hose, but this should be checked by the competent electrician certifying the installation.

Temporary cables installed in the open, especially where close to site boundaries, may need to be protected from theft.

In cases where there is no local mains electricity connection point a generator may be utilised for electrical power, but this must be fitted with suitable isolation and protection devices, correctly sized for the anticipated load and any additional motor starting currents, and the whole installation must be fully inspected and certificated by a competent electrician before the boiler is put into service.

4.11 Fuel Supply

Many temporary boiler installations will be gas fired, but where gas is not available or the connection point is too far away or too complex, gas oil can be utilised.

If the gas connection point is close to the trailer, a steel piped connection is the best option. It may be prudent to include a short length of flexible hose of suitable construction to relieve the effect of any movement or vibration on the gas line, but the flexible pipe must be well supported, not put under any undue strain, cross bonded electrically at both ends and at any joint flanges, and correctly sleeved and protected in accordance with IGEM recommendations.

On sites where domestic premises are present or people sleep, Gas Safe registration is required for personnel breaking into gas ways. For factories and some other installations Gas Safe registration is not mandatory and such training may not be appropriate for the larger gas installation, so the CEA I-GAS accreditation is a more suitable qualification.

If oil is to be used, a suitable tank can usually be provided by the hire company and located close to the trailer. This will be double skinned for impact and leak protection, and short lengths of suitably rated flexible hoses provided to connect to the burner. Tanks should include overfill prevention, a bund alarm, and level gauge as a minimum. Delivery access for refuelling must be considered, and drip trays or drain covers provided if necessary.

The use of liquid fuels other than gas oil (such as kerosene) will need to be checked in advance with the boiler hirer.

If the fuel oil supply is already part of the customer's assets, a temporary fuel line will be required. This must be constructed from appropriate materials, adequately supported, protected from frost if necessary at the location, and drip trays provided at any likely failure points. Lengths of flexible hoses may be suitable, but all the rules above in Table 1 still apply in relation to selection, handling, installation and testing.

4.12 Environmental permits

The implementation of the Medium Combustion Plant Directive across the UK in December 2018 now means that every unit that combusts any fuel which is between 1MWth and 50MWth nett rated thermal input must now, or within a few years, comply with the Environmental Permitting Regulations relevant to the location of the plant.

New boilers first used on or after 20/12/18 must be registered and permitted before first firing. Existing boilers >5MWth must be permitted by 1/1/24 and meet emission limits (ELVs) by 1/1/25. Existing boilers <5MWth must be permitted by 1/1/29 and meet emission limits by 1/1/30. Slightly different dates and procedures exist in devolved UK nations, but the primary dates specified here are to be complied with for every combustion installation in scope.

Boilers firing on gas or gas oil must measure and meet exhaust gas NOx limits and also measure CO. Other fuels such as heavy oil, landfill gas or LPG may have to measure SO_2 and total dust as well, according to tables in the legislation.

Local Authorities have the right to impose reduced ELVs where air quality concerns make this necessary for the protection of human health. The advice of the Local Authority and the Environment Agency (or their equivalents in the devolved administrations) should be sought before hiring a temporary boiler.

At the time of writing the rules for hire boilers under MCPD are not entirely clear. The recommended position is therefore that the boiler owner (the Hire Company) keep a full record of the boiler itself (parts of Annex 1 in the MCPD refers), noting the places it has been, the start and end dates of those deployments, the emissions recorded at the time of commissioning on site, and the full details of the person to whom they hire the plant.

The hire company then tell the person who owns the site where the boiler is deployed (the Operator) to keep their own records of fuels used, hours run, further emissions test results if carried out, and any other relevant information, and to consider calling the Regulator (EA etc.) for permitting advice, especially if they already have an MCP or other similar permit on site.

4.13 Commissioning

Commissioning of the temporary boiler installation should be a joint exercise between the hire company and the installation company, with support from site staff as necessary. Time must be allowed for all parties to 'walk the line' and check that all parts of the installation are correctly completed. Full commissioning of a large steam boiler, including warming through, can take 40-50 hours or more, and when acceptable steam output conditions are reached there needs to be a steam load on site for accurate setting up of the boiler.

Water treatment commissioning should only be carried out by competent persons that can demonstrate relevant experience and have been suitably trained in accordance with BG04. The hire boiler should not be fired until it is proven by waterside analysis that the boiler has been filled with suitably treated water, in accordance with BG04.

The Competent Person for the site may wish to witness certain tests.

4.14 Insurance

It is recommended that the insurance of temporary boilers in transit, during installation and de-commissioning, and in use, is discussed between the hire company and their customer at the earliest opportunity. It is further recommended that the customer's Competent Person is consulted as soon as there is a clear plan for the installation of any temporary pressure plant.

In general terms:

- Insurance for delivery to the site location and later removal is the boiler owner's responsibility;
- "Hired in" plant insurance to cover full replacement value of the plant for the duration of the hire is highly recommended, and the boiler user is encouraged to seek assistance from their broker;
- Details of Insurance arrangements will be contained in the Terms & Conditions of Hire supplied by the boiler owner.

Competent Person inspections in accordance with PSSR may also be required, and the site owner's CP should be consulted at an early stage in the process.

4.15 Electrically powered boilers

There is increasing interest in the industry regarding electrically powered steam boilers, and they are just becoming available for hire. Electric boilers (normally those with a submerged heating element and a steam space above) have some distinct advantages over furnace tube combustion boilers, and also some points of caution that need to be addressed.

Some of the significant advantages include:

- Faster start up and shutdown;
- Less operational involvement;
- Inherently fail—safe operation with limited residual heat in the pressure envelope;
- Similar control and safety devices for operation compared to fire tube steam boilers (gauge glasses, safety valves, level control, blowdown etc.);
- No requirement to meet MCPD or Clean Air Regulations;
- Smaller water volume for a given output.

However, there are some important points to consider in relation to electric boilers such as having an adequately rated electrical supply close to the point of connection, and good water quality.

It is often found that the size and characteristics of the available electrical supply on a site are inadequate to be able to support an electric steam boiler without infrastructure changes. Apart from a need to supply a very large electrical load, there may be other constraints due to fault levels existing on site or nearby, and the possibility of harmonic disturbances or load shedding requirements, all of which need to be addressed by suitably qualified electrical engineers before the use of an electric boiler is contemplated.

In a simple example, a small 300kW boiler which will give a steam output of around 450kg/h @ 10bar will require electrical switchgear rated at 450 Amps per phase 3 phase 400V, with cabling and other facilities to match. This may be unachievable on the site in the short term, and for larger electric boilers, depending on the capability of the local infrastructure in the area, may be impossible without extensive electrical distribution infrastructure being enhanced by the network operator, a lengthy and costly exercise.

Water quality in electric boilers is a specialist area and it is strongly advised that the services of a suitably qualified steam boiler water treatment chemist are used at the planning stages, since it is easy to have water conditions in an electric boiler that are totally unsuitable for the materials of construction and the extended life of the overall plant.

Flat Guard (left) and Procoil flexible hose protection

Images courtesy of ADT Flexibles

5 OPERATION AND MAINTENANCE

5.1 Daily operations

The hire company will provide instructions for the daily operation of the boiler and any emergency instructions or procedures, and these should be followed carefully and incorporated into the operating procedures of the customer. The customer is almost always fully responsible for the daily operation of the hired boiler, and this must be carried out in accordance with legal requirements and any permits issued to the site, and by trained and competent boiler operators following the hirer's instructions.

It is quite likely that the manning arrangements that were assessed as adequate for the customer's own plant may not be so appropriate for the hired boiler, or the duty required of the hire boiler is not the same as for a fixed production unit, so a risk assessment of the manning levels and boiler operating regime must be undertaken.

Alarms that are normally utilised on site for the user's own plant may not be connected to the hire boiler, and different fuel may be used, so a clear understanding of the new risks must be established.

Log sheets will be provided by the hire company and they will expect to receive routine reports of the operation of their boiler. Weekly returns are recommended, and these should include details of the water treatment regime and associated tests being carried out, confirmation of statutory checks and tests being carried out such as evaporation testing and gauge glass drills, and any other tests that the owner of the boiler requires to be done.

5.2 Maintenance

Routine maintenance of the hired boiler will usually be the responsibility of the hire company unless other contractual arrangements have been made. The hire company will expect the customer to report any issues that arise during the operation of the boiler, and to do so promptly to help protect the boiler.

It is suggested that a clear understanding of maintenance responsibilities and call out procedures is documented at the time of hiring the boiler.

5.3 De-commissioning

Hire boilers must be returned in the condition they were supplied with all the customer's fixtures and fittings removed – the hire company will specify their detailed requirements. The boiler, hoses and any other hired equipment must be drained, so adequate provision for disposing of several tons of treated water must be available, and this must not be sent to the public sewer at greater than 43^{o}C. The boiler, hot well and blowdown vessel must be empty, and any fuel tanks or other containers also emptied safely.

Chemicals used in the boiler whilst on hire and any liquid fuels must also be removed from the trailer before the boiler is ready to return.

Waste chemicals must be handled in accordance with relevant safety and environmental legislation, and approved waste contractors must be employed if the chemicals go off site.

6 CHECKLISTS FOR HIRE COMPANIES AND THEIR CUSTOMERS

A temporary steam boiler installation requires just as much planning and organisation as a new static boiler installation, except that the work is often compressed into a few days rather than a longer period of planning and preparation. Anything that can be done to pre-empt possible problems and 'design out' any hazards or pitfalls should be carried out in advance so as to minimise lost time when the hire boilers are required, often as a matter of urgency.

The Hire Boiler contract must clearly state who is responsible for the temporary steam or hot water pipework installation, including any flexible pipework, and its incorporation into a Written Scheme of Examination.

In order to provide a safe and successful temporary boiler installation the following points should be considered by the hire company and discussed with the site operators:

- A site assessment/checklist should be created to identify and eliminate any site issues which could potentially cause hire equipment to fail or could impact on safety.
- The duration of the hire must be considered and the client informed that solid steam pipework is the preferred and safest way to transfer steam and other services from the hire boiler to their system.
- Length of Hire – consideration must be given to using solid pipework if the hire is to last more than the minimum hire period, with solid pipework being expected for hires in excess of 12 months.
- Solid Pipework – create a list of competent sub-contractors who can install hard pipework and flexible pipework on behalf of the hire company.
- Flexible Pipework Security and Elevation – adjustable stands which can be used to raise, support and secure flexible and temporary hard pipework along the pipe run should be used.
- Temporary Solid Pipework - Stock lengths of steel pipework, joints and elbows that can be used instead of flexible pipework for straight runs etc.
- Testing of Hoses – periodically test hoses at works and after every hire.
- Hose Installation Guide – see the Appendix to this guide.
- Suitable protection in place to prevent the hire boiler output exceeding the Safe Operating Limits of the customer's system – note: the boiler safety valve is designed and selected to protect the boiler from over pressure events, not to protect the customer's system. Discuss with the CP if in any doubt,
- Boiler water testing and treatment to BG04 is essential.

Typical steam hose installation

6.1 Temporary steam or hot water pipework supplied by the Hire company

The Hire company who own and/or supply temporary pipework for their customers to use as part of a temporary boiler installation shall:

1. Discuss with their Competent Person (CP) whether the temporary pipework requires a Statutory or Non-Statutory examination report as part of an "Out of Service Examination".
2. If Statutory – An individual Written Scheme of Examination (WSE) must be produced for each section of pipework before the "Out of Service Examination" takes place. The CP shall examine individual sections of the temporary pipework in accordance with the WSE and produce a Statutory "Out of Service Examination" report.

   Note: Such pipework would not normally have an "In-Service Examination" at the hire boiler premises but at the customer's premises.
3. If Statutory - Within the WSE "special requirements" section, the following statement shall be included;

   "When installed and before the pipework system is used for the first time, the customer's CP needs to examine the installation, verify that a suitable WSE is in place and then produce a Statutory "In-Service Examination" report for the temporary pipework."
4. If Non-Statutory – the hire company CP shall examine individual sections of temporary pipework and produce a "Non-statutory Out of Service Examination" report advising within the report that:

   When installed, and before the temporary pipework system is used for the first time, the customer's CP needs to examine the installation and verify whether the system falls within the scope of PSSR 2000. If it does, then the customer's CP shall produce or modify the customer's WSE and produce a "Statutory Interim Examination" report for the temporary pipework.

6.2 Temporary steam or hot water pipework supplied by the customer:

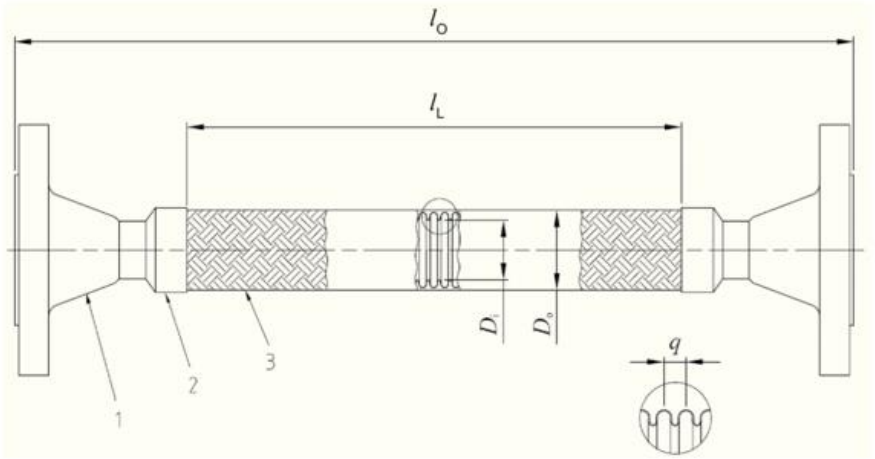
Customers who supply temporary pipework for their own use as part of a temporary boiler installation shall ensure that their Competent Person:

1. Verifies that there is a Hire Boiler steam system WSE in place and that the boiler and blowdown vessel Statutory reports are in-date.
2. Verifies individual sections of temporary pipework supplied by the Hire Company have Statutory or non-Statutory "Out of Service" examination reports that are in-date.
3. Verifies that the installation of any temporary pipework is acceptable and safe.
4. If the pipework system falls within the scope of PSSR 2000, either reviews the hire boiler WSE, or produces or modifies the customer's WSE by identifying the temporary pipework termination points, typically from the hire boiler crown valve outlet flange to the customer's temporary hire boiler steam inlet isolation valve.
5. Assesses the capacities and ratings of the different systems, interconnecting temporary pipework and the associated protective devices for both the hired system and the fixed system on site. Any discrepancies must be resolved before the hire boiler is brought into first use, e.g. has the hire boiler safety valve "set" pressure been adjusted so as not to exceed the lower Safe Operating Limit (SOL) of the customer's system. **To ensure the safety valve is correctly sized at this lower pressure a steam accumulation test must be undertaken**.
6. Produces a Statutory or Non-Statutory "In-Service Examination" report for the temporary pipework as required.

6.3 Permanently installed pipework between the hire boiler and the customer's system inlet isolation valve

1. The Hire Boiler contract with their customer must clearly state who is responsible for the permanent pipework design, installation and subsequent examinations.
2. The appropriate CP (depending on contract details) is to ensure that permanent pipework is manufactured in accordance with the Pressure Equipment Regulations and examined in accordance with PSSR 2000 as necessary.
3. If the permanent pipework falls within the scope of PSSR 2000 then it must be incorporated into a suitable Written Scheme of Examination (WSE) and examined in accordance with that WSE. A "Statutory Examination" report for this permanent pipework must be produced by the customer's CP prior to it being placed into service.

Diagram of a metal hose assembly from BS EN ISO 10380:2012



Key

1	end fitting
2	ferrule
3	corrugated metal hose/braid
D_i	internal diameter
D_O	outside diameter
l_L	active live length
l_O	overall length
q	pitch of the hose profile

7 LEGISLATION

The following is a non-exhaustive summary of key regulations applying to hired boilers. A range of supporting material can be found on the HSE website including Approved Code of Practice documents, Health and Safety Guidance, and Legal Reference documents.

Note: Be aware that Approved Codes of Practice (ACOP) and other guidance documents are often withdrawn by HSE and not replaced; for this reason CEA have created new guidance documents. As an example, the Management of Health and Safety at Work Approved Code of Practice (ACOP – L21) has been withdrawn and is no longer available. If you are looking for information on how to manage risks in your business, HSE has a suite of guidance that will be able to help. Each level of guidance on HSE's website offers appropriately targeted information, focussed on making compliance as straightforward as possible.

A revised and enhanced online version of 'Managing for Health and Safety' (also known as HSG65) is now available. The guidance is divided into four sections:

- Core elements of managing for health and safety
- Are you doing what you need to?
- Delivering effective arrangements
- Resources

The first two sections of Managing for Health and Safety are targeted at leaders, owners, trustees and line-managers, whilst the third part will be particularly useful to those who need to put in place or oversee their organisations arrangements for health and safety. It will also be of value to workers and their representatives.

7.1 The Management of Health and Safety at Work Regulations 1999 (MHSWR)

MHSWR apply to every employer and self-employed person who carries out any work activity.

Note: All future references to employers in this guidance should be read to include self-employed persons.

The MHSWR impose a duty to manage all risks from any work activity, not only within the workplace itself, but also any risks to all persons (including any non-employees) who may be affected by the activity in question.

Regulation 3 requires the completion of a suitable and sufficient risk assessment of the work activity in order to properly identify and adequately manage any risks. This is of central importance. The risk assessment should identify sensible measures to control identified risks that may otherwise result in injury or danger.

Risk assessments must be reviewed periodically and when there is a significant change e.g. system variation, system failure, change in operating parameters or manning levels etc. The outcome of any reviews should also be recorded. Adding a temporary boiler to your system is a good example of when a risk assessment needs to be reviewed.

Should you be unfortunate enough to have an accident or incident with equipment on your plant and especially if somebody is injured, HSE will often use the MHSWR to prosecute both **You and your Company** when apportioning blame. This is irrespective of the accident falling under other regulations such as PER, PSSR etc.

7.2 The Pressure Equipment (Safety) Regulations 2016 (PER)

The PE(S)R apply to pressure equipment and assemblies with a maximum allowable pressure PS greater than 0.5 bar, although there are a number of exclusions, which are set out in regulation 4 and Schedule 1 to the Regulations. “Pressure equipment” means vessels, piping, safety accessories and pressure accessories. “Assembly” means several pieces of pressure equipment assembled to form an integrated, functional whole.

All new and substantially modified pressure equipment (including steam raising plant and hot water plant with a design temperature >110 ˚C) comes within the scope of PER and they must comply with its requirements before they may be supplied for use.

A section of gov.uk is dedicated to a detailed description of how to apply these Regulations.

7.3 The Pressure Systems Safety Regulations 2000 (PSSR)

PSSR set out the main legislative requirements to ensure the continued safety of pressure systems in use. PSSR applies to two clearly defined categories of people **(duty holders)**. These are:

> **‘Owner’** – This means an employer or self-employed person who owns a pressure system. Where the employer who owns the system does not have a place of business in Great Britain, or an agent in Great Britain who would take responsibility, then the user (see below) will be responsible.
>
> **‘User’** – This means the employer or self-employed person who has control of the operation of the pressure system.

The distinction between **‘Owner’** and **‘User’** can be important in certain circumstances in determining the duty holder responsible for ensuring compliance with certain regulations under PSSR. In general, owners carry more responsibility in relation to mobile plants, while users have more responsibilities in relation to installed systems.

However, *“mobile system” means a pressure system which can be readily moved between and used in different locations* (Reg 2), but para 39 of the ACoP says :

> “… *a steam boiler fitted with skids may be installed temporarily to maintain steam supply to the site during the replacement of an existing boiler. (Such an installation should not be treated as a mobile system. This equipment will also require proper testing and checks before it is taken into use,*).

PSSR therefore applies equally to fixed and temporary steam and relevant hot water boilers, and the duty holder of a temporary boiler installation is the User. The role of the user is generally a corporate responsibility (ACoP para 46).

The “pressure system” means

> *(a) a system comprising one or more pressure vessels of rigid construction, any associated pipework and protective devices;*

So this includes the interconnecting pipework that the customer designs and uses to connect the boiler they have hired to the system that they currently own and ‘use’. A hired boiler is a pressure vessel that is incorporated into a pressure system and is just one of many components of that system.

Boiler hire companies will provide systems that have been inspected under their Written Scheme of Examination where appropriate and this will be up-to-date for the unit supplied. However, this hired boiler will require annual (14 monthly) inspection under the WSE, with the limitations to operations that this might imply.

Reg 4 of PSSR confirms the design responsibility:

> *1) Any person who designs, manufactures, imports or supplies any pressure system or any article which is intended to be a component part of any pressure system shall ensure that paragraphs (2) to (5) are complied with.*
>
> *(2) The pressure system or article, as the case may be, shall be properly designed and properly constructed from suitable material, so as to prevent danger.*
>
> *(3) The pressure system or article, as the case may be, shall be so designed and constructed that all necessary examinations for preventing danger can be carried out.*
>
> *(4) Where the pressure system has any means of access to its interior, it shall be so designed and constructed as to ensure, so far as practicable, that access can be gained without danger.*
>
> *(5) The pressure system shall be provided with such protective devices as may be necessary for preventing danger; and any such device designed to release contents shall do so safely, so far as is practicable.*

The designer of a pressure system

> *shall provide sufficient written information concerning its design, construction, examination, operation and maintenance as may reasonably foreseeably be needed to enable the provisions of these Regulations to be complied with. (Reg 5.1)*

This also applies to the employer of a person who modifies or repairs any pressure system (Reg 5.2).

The employer of a person who installs a pressure system at work

> *shall ensure that nothing about the way in which it is installed gives rise to danger or otherwise impairs the operation of any protective device or inspection facility. (Reg 6)*

The ACoP (L122) section 6 gives a comprehensive list of the things a pressure system installer shall do.

The user of a steam system is responsible for complying with the following requirements of PSSR:

- Safe Operating Limits (SOL) have been set and are not adjusted without informing the Competent Person (CP) and manufacturer where appropriate. (Reg 7)
- The system is never operated unless a current Written Scheme of Examination (WSE) is in place. Any requirements of this scheme e.g. a report of the last examination must also be satisfied (Regulations 8 & 9).
- The items identified in the WSE are examined by a CP in accordance with the requirements of the scheme.
- All repairs and modifications must be carried out by people suitably competent in such work (Regulation 13). You must discuss and agree any changes with the “Competent Person” and include any changes within your written scheme of examination (WSE).
- The statutory technical documentation and other records must be kept and, where required, be made available for examination.
- Records must be transferred when the ownership of a system changes (Regulation 14).

Duty holders must keep all reports produced under the WSE for the entire life of the system; these records should go with a pressure vessel if it is sold on to another party.

The results of all tests and examinations must be recorded and retained for a suitable period (Regulation 14). A period of at least two years is recommended for records of routine tests. These may be kept on-site or at a designated central location but wherever they are kept, they should be secure, safe and easily accessible.

Examples of the type of records that should be kept and made available for scrutiny include:

- Written Scheme of Examination (WSE).
- Record of periodic tests (e.g. Non-Destructive Testing (NDT), Hydraulic test).
- Certificates of thorough examination.
- Records of servicing and modifications.
- Examination reports.
- Risk assessment.
- Manufacturer's records and instructions.
- Maintenance records.
- Training records.
- Audit reports.
- Test logs.
- Water treatment records.

7.4 The Pressure Equipment Directive (PED) 2014/68/EU

The Pressure Equipment Directive (PED) applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure greater than 0.5 bar gauge including vessels, piping, safety accessories and pressure accessories.

The PED provides a legal structure whereby pressure equipment can be manufactured and sold throughout the European Union without having to go through a local approval regime in every member state. The means by which this is achieved is to ensure common standards of safety in all pressure equipment sold within the European Economic Area. Manufacturers are therefore able to meet the requirements for approval in any member state of the EU, and do not have to repeat the process when selling goods in any other state.

7.5 The Provision and Use of Work Equipment Regulations 1998 (PUWER)

Any employer who either provides equipment for use at work (including boiler systems) or has control over the way equipment is used at work has a legal responsibility to comply with the relevant provisions of this regulation. An important, often overlooked, requirement under PUWER is that a logbook, when provided, must be kept up to date.

Other parts of PUWER of relevance to boiler systems cover such topics as equipment suitability, maintenance, inspection, information and instructions, training and control systems.

In particular, paragraph 77 of PUWER says that if items of plant and equipment are hired, it is important for both the hire company and the person responsible for hiring the equipment to establish who will carry out safety-related maintenance. This is particularly important when equipment is on long-term hire. The terms of the agreement should be set out or recorded in writing.

If the hire company is some distance from the user site, it might be uneconomical for their staff to carry out simple checks and make minor adjustments, so the user may agree to carry them out. However, both parties should agree exactly what they are responsible for and make sure that this is communicated to the people who will be carrying out the maintenance.

7.6 The Water Industry Act 1991

Section 111 prohibits waste steam or any liquid at a temperature higher than 43°C being discharged into public sewers as well as the discharge of any material likely to interfere with the free flow of fluids.

7.7 The Construction (Design and Management) Regulations 2015 (CDM)

Although installing a temporary boiler may not be a large enough project on its own to be notifiable under CDM, the principles of the regulations should still be followed, and if the work is part of a major installation the regulations will apply in full and should be considered at every stage of the project from conceptual design through installation to maintenance and ultimate demolition.

If more than one contractor will be involved, the client will need to appoint (in writing) a principal designer and a principal contractor.to ensure that the CDM Regulations are properly followed.

Pressure controls for a temporary installation
Image courtesy of Byworth Boiler Hire

8 REFERENCES AND FURTHER READING

The following is a list of applicable documents current at the time of preparation of this publication. This is an indicative, not comprehensive list.

- Free copies of all legislation are available from www.legislation.gov.uk.
- Legislation marked with an asterisk is supported by Approved Codes of Practice and Guidance (ACOP) published by HSE.
- Legislation marked with a double asterisk is supported by more than a single ACOP

1. Health and Safety at Work etc Act 1974.
2. Management of Health and Safety at Work Regulations (MHSWR) 1998 SI 1999/3242.
3. Provision and Use of Work Equipment Regulations (PUWER) 1998* SI 1998/2306.
4. Electricity At Work Regulations 1989 - SI 1989/635
5. Confined Spaces Regulations 1997* - SI 1997/1713.
6. Control of Substances Hazardous to Health Regulations (COSHH) 2002* SI 2002/2667.
7. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR)** SI 2002/2776.
8. Control of Noise at Work Regulations 2005 - SI 2005/1643.
9. Construction Design and Management Regulations (CDM) 2015* - SI 2015/51.
10. Supply of Machinery (Safety) Regulations (SMSR) 2008 - SI 2008/1597.
11. Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 - SI 2016/1107.
12. Pressure Equipment (Safety) Regulations (PER) SI 2016/1105.
13. Pressure System Safety Regulations (PSSR) 2000* - SI 2000/128.
14. Work at Height Regulations 2005 SI 2005/735.
15. The Regulatory Reform (Fire Safety) Order 2005 – SI 2005/1541.
16. The Gas Safety (Installation and Use) (Amendment) Regulations (GSIUR) 2018 * SI 1998/245 .
17. The Environmental Permitting (England and Wales)(Amendment) Regulations 2018 SI2018/110 (MCPD).
18. L5 The Control of Substances Hazardous to Health Regulations 2002. Approved Code of Practice and guidance.
19. L22 Safe use of work equipment Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance.
20. L101 Safe work in confined spaces. Confined Spaces Regulations 1997. Approved Code of Practice, Regulations and guidance.
21. L108 Controlling noise at work The Control of Noise at Work Regulations 2005 Guidance on Regulations.
22. L122 Safety of pressure systems. Pressure Systems Safety Regulations 2000. Approved Code of Practice.
23. L138 Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance.
24. L153 Managing health and safety in construction. Construction (Design and Management) Regulations 2015. Guidance on Regulations.

25. HSG253: The safe isolation of plant and equipment.
26. Permit-to-work systems HSE INDG98 ISBN 0 7176 1331 3
27. HSE Pressure Systems website http://www.hse.gov.uk/pressure-systems/index.htm
28. Pressure Equipment Directive (PED) 2014/68/EU
29. BG01 Guidance on Safe Operation of Steam Boilers. (CEA and SAFed)
30. BG02 Guidance on Safe Operation of Hot Water Boilers. (CEA)
31. BG03 Guidance on Steam Boiler Blowdown Systems. (CEA)
32. BG04 Guidance on Boiler Water Treatment. (CEA)
33. BG06 Hot wells and de-aerators, safe installation and use (CEA)
34. BG10 Guidance on Safe Isolation of Plant and Equipment (CEA)
35. BS 799: Part 4:1991 Specifications for atomising burners (other than monobloc type) together with associated equipment for single burner & multi-burner installations.
36. BS 5410-2:2013 Code of practice for oil firing - Part 2: Installations over 45 kW output capacity for space heating, hot water and steam supply services.
37. BS 5925:1991 Code of practice for Ventilation principles and designing for natural ventilation.
38. BS 6644:2008 Specification for Installation of gas-fired hot water boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases).
39. BS 7671 Requirements for electrical installations. IET Wiring Regulations.
40. BS EN 298:1994 Automatic Gas burners Control systems for gas burners and gas burning appliances with or without fans.
41. BS EN 676:1997 Automatic Forced Draught Burners for Gaseous Fuels.
42. BS EN 746:1997 Part 2 safety requirements for Combustion and Fuel Handling Systems.
43. BS EN ISO 10380:2012 Pipework — Corrugated metal hoses and hose assemblies
44. BS EN 12953 Shell Boilers.
45. BS EN 13480 Metallic industrial piping
46. EN 45510 Guide for procurement of power station equipment Part 3-2 Shell Boilers.
47. IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems.
48. Institution of Gas Engineers and Managers Utilisation Procedure IGE/UP/1A - Strength/tightness testing and direct purging (Small I&C) and IGEM/UP/1C - Strength/tightness testing and direct purging (Meters).
49. Institution of Gas Engineers and Managers Utilisation Procedure IGEM/UP/2 - Installation pipework.
50. Institution of Gas Engineers and Managers Utilisation Procedure IGEM/UP/10 Installation of gas appliances in industrial and commercial premises.
51. Institution of Gas Engineers and Managers IGEM/UP/12 Application of burners and controls to gas fired process plant.
52. Institution of Gas Engineers and Managers IGEM/UP/16 Design for Natural Gas installations on industrial and commercial premises with respect to hazardous area classification and preparation of risk assessments.
53. Institution of Gas Engineers and Managers IGEM/SR/25 - Hazardous area classification of Natural Gas installations.

APPENDIX 1 – TYPICAL FLEXIBLE HOSE INSTALLATION INSTRUCTIONS

Courtesy of ADT Flexibles:

Flexible Hose Installation and Safety

In order to obtain long life and satisfactory service from stainless steel hose it should be installed in the correct manner.
The main cause of failure is fatigue in the convolutions and in order to minimise this, the hose should be installed as shown below. It should be remembered that all flexible hoses have a limited life and when they are used in applications where dangerous chemicals or hot inflammable fluids are passing through them, they should be examined and re-tested at regular intervals. Our hoses are manufactured in accordance with BS EN ISO 10380: 2012.

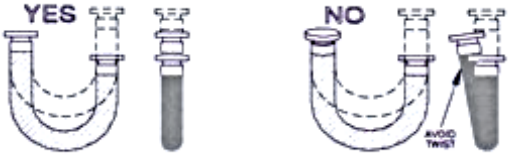
Pressure Equipment Directive (PED) 2014/68/EU

Hoses are generally supplied in accordance with the appropriate PED. They should only be used for applications within the category they have been supplied to. Hoses will be marked as follows: Sound Engineering Practice – ADT, Job No., and Date. Category 1- CE, ADT, Job No., Date. Category 2 – CE, ADT, Job No., Notified Body's identification number.

Avoid Over Bending

Stainless Steel hoses should not bend to a radius smaller than recommended, or fatigue and premature failure can occur. Avoid sharp bends near fittings.

Do not Torque



Torque or twisting is damaging to stainless steel hoses. To avoid this, use either a union or swivel flange at one end in place of a rigid connection. Always install hoses so that movement originates in the same plane as the centre line. If the hose is installed twisted this will lead to a premature hose failure.

Avoid Compression & Tension

Hose life will be reduced if the hose is installed in compression or under tension.

Avoid Rubbing
Hose life will be considerably reduced if the hose is installed in a position where it is allowed to rub against metallic or other objects.

Damaged Hoses
Any hose showing any signs of damage or leaking must be replaced immediately.

Never Over-Pressurise
Hoses must not be used above the safe working pressure.
(MWP/Design pressure stated on your Purchase Order)

Corrosive
Always consult our technical sales department before using hoses with corrosive chemicals.

Whenever you need to hire temporary boiler plant always contact your competent person first.

In whatever shape or form your temporary boiler arrives on site it is extremely important to install it correctly and avoid the potential risk of accident or incident. This guide has been written to help you understand the need to design the installation correctly, to meet all of your legal obligations and other requirements as the **End User/Owner of that steam system.**

Changes from Edition 1 to Edition 2

Various text alterations and enhancements throughout to better describe recommended procedures

Enhanced installation guidance throughout

Revised flexible hose selection, handling and installation advice

New photographs and diagrams to show examples of installations and equipment

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This document will be formally reviewed periodically, although amendments and revisions may be made more frequently as required.

Users of this document should ensure they are working to the latest edition of this document and the related legislation and guidance.

Whilst every care has been taken in the preparation of this guide by The Combustion Engineering Association (CEA) and its allied equipment manufacturers and contributors, no liability can be accepted for the consequences of any inaccuracies or misstatements.

Temporary Steam and Hot Water Boiler Plant - Guidance for Safe Installation and Use

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