Scope of Works

Title: Workshop Heating Upgrade

Project: EM039

Date: 13/07/17

Author: Veekash Bhowruth

Owner: David Shadwell

Client: The Pirbright Institute

Version No: 1

1 Scope of Works History

1.1 Document Location

All project documentation will be stored in the following location on the Pirbright server:

N:\Capability Projects\Private\Operational Projects\EM039 – Pirbright Steam Phase 2

1.2 Revision History

Version	Date	Details	Author
1	13/07/17	First Issue.	VB

Changes from previous version are highlighted yellow.

1.3 Approvals

This document requires the following approvals.

Name	Title	Signature	Issue Date	Version
Iain Paterson	Capability EMS Leader – Projects & Process		13/07/17	1
David Shadwell	Senior Capability EMS leader.		13/07/17	1

1.4 Issue History

In addition to the approvers, this document has been issued to:

Name	Purpose	Date of Issue	Version
Contract Finder	For Tendering Purposes	13/07/17	1

2 Table of Contents

3 Introduction

3.1 Document Purpose

The primary purpose of this document is to provide information to potential suppliers to allow for budgetary quotation.

This document is to be considered “live” and will evolve to incorporate more detail as the project progresses, eventually containing full details for construction to begin.

This document details the envisaged requirements of the works but should not been seen as restrictive. All parties should advise if:

- Appropriate alternatives are available.
- Additional requirements are needed.
- Items or works are not required.

This document is also intended to fulfil the client brief and pre-construction information aspects of construction design management (CDM) regulations. Construction phase plans will be separate documents for various work elements as required.

3.2 Summary Description of works

This scope of work document details the requirements to provide a new hot water generation plant to the Workshop to enable the existing steam supply to be disconnected, as part of the future demolition works planned as per the overall site development programme.

The scope of work required for this project are as follows:

- New hot water generation plant to supply heating and hot water to the Workshop and MOD 2 buildings.
- Installation of Fuel Tank and ancillaries as required.
- Removal of redundant plant

Sketches showing the proposed works are included in appendix A.

4 General requirements

This section describes the general requirements related to delivering these works at The Pirbright Site.

4.1 Contact details

The TPI Project Manager for these works is:

- Veekash Bhowruth
- veekash.bhowruth@pirbright.ac.uk
- 07866 776 387
- Normal working hours: 0800h to 1600h, Monday to Wednesday

4.2 Location of works

These works will take place at the following addresses:

The Pirbright Institute
Ash road,
Pirbright,
Woking,
GU24 0NF

4.3 Health & Safety Requirements

All works should be performed in line with site Health & Safety (H&S) rules and the health and safety at work act 1974.

The following sections highlight H&S aspects to be considered for the works and further details are included in the site rules for contractors document, included in appendix C.

4.3.1 Risk Assessments & Method Statements

Any works on the site must be preceded by a risk assessment and method statement (RAMS). These must be submitted to the site contact at least 5 days in advance of the 1st day of works.

RAMS must not be generic but specific to the task and date of the works and should take the form of a fully detailed step by step method.

RAMS should not try and cover the full scope of works, but should be written for the various work elements or construction steps as appropriate.

Although RAMS are never “approved” by PIR personnel, they will be reviewed by PIR personnel and feedback will be given. Works will not be allowed to take place if the RAMS are felt to be inappropriate.

Where possible, RAMS should be accompanied by drawings to help explain their context.

Further details are included in the contractor’s site rules included in appendix D.

4.3.2 Tools and Equipment

The contractor should provide all tools and equipment they require to complete their works.

Equipment used by contractors should be kept in good working order.

Electrical equipment should be PAT tested.

Were appropriate calibration, inspection and testing certificates of equipment being used should be issued to the site contact before being used. This is particularly important for safety equipment and lifting equipment.

4.3.3 PPE

Contractors should provide and use their own personal protective equipment (PPE). PPE used should be suitable for the works and should be detailed in the RAMS.

4.3.4 Barriers and Warning signs.

Area of works must be cordoned off with suitable barriers and warning signs to prevent unauthorised pedestrian access during work activities.

Contractors must provide their own barriers and warning signs.

4.3.5 Scaffolding and access equipment

Contractors can arrange their own scaffolding required to facilitate works or use the site preferred supplier (request details from site contact if required).

Contractors are expected to provide their own temporary access equipment such as ladders and mobile platforms. These should be class 1 (industrial) certification standard.

All scaffolding and access equipment should not be used without in date inspection and tagging.

4.3.6 Equipment certification

Where appropriate, inspection

4.3.7 Permits

Permits to work are issued by the site contact for the following work types:

- Hot works.
    - Includes power cutting tools such as drills, saws and grinders as well as welding etc.
    - Includes the requirement for fire watchers 30 mins & 60 mins (indoor works only) after hot works have been completed.
- Working at height.
    - Includes any works over 2m.
- Isolations.
    - Includes fore alarm isolations, which must be done on a daily basis.
- Excavations.
- Confined Space.

Permits will be issued on a daily or weekly basis as appropriate.

4.3.8 Isolations & LOTO

All electrical & mechanical Isolations will be performed under permit by PIR engineering staff and should be witnessed by the contractor performing the work.

These isolations should then be secured with padlocks on a lock off tag off (LOTO) basis where appropriate.

4.3.9 Asbestos

An asbestos survey is currently being conducted and results will be made available as soon as possible. Any work required in relation to removing asbestos lagging will not be part of this scope of works. If any other suspected asbestos is identified during the works then works in the area should be stopped and it should be highlighted to the site contact, who will arrange sampling to take place.

4.3.10 Emergency Procedures

If an emergency event is discovered, such as a fire or medical emergency, the site gatehouse should be contacted for assistance on the emergency extension number 1000 or on radio channel 1.

On discovering a fire, the area should be evacuated and all personnel should go to the fire assembly point. If safe to do so, fire alarm call points should be activated on the way out of the area.

In the event of a fire alarm, works should cease and contractors should make their way to their fire assembly point (to be given by the site contact).

4.4 Security and Site Access Requirements

4.4.1 Site access

All personnel must have visitor forms raised for them by their site contact before arrival on site, therefore a full names and dates of all personnel attending site must be provided at least 24h in advance.

Contractors must report to the gatehouse and present photo ID each time they access site.

Contractors must also sign in and out of the E&M contractor's office each time they access site.

Contractors may be required to attend a construction site specific tool box talk at the beginning of the works and as required throughout the works to highlight particular hazards and activities associated with the works.

4.4.2 Site inductions

All personnel performing works on site must have completed a site induction within the last 12 months. Inductions take approximately an hour and can be arranged to take place on the 1st day of the works.

4.4.3 Site Rules for Contractors

The site rules for contractors are included in Appendix C.

Highlights and additional requirements are included in the following sections.

4.4.4 Escort requirements

Contractors must be fully escorted by Pirbright personnel unless there are approved contractors within the team. Therefore it is recommended that an appropriate number of contractors in each team should complete an institute security check (performed by Agenda). The cost of this is covered by the institute. This process can take up to 2 weeks to complete.

In order to do initiate this process, provide full names and an email address specific to the person to the site contact.

Even approved contractors may require an escort in certain restricted areas of site.

NOTE: none of the works in this scope is envisaged to be within restricted areas.

4.4.5 Vehicle movements

Vehicle movements on site are to be via on site roadways only. The site speed limit of 10 mph must be observed at all times and extra caution should be taken by drivers due to site pedestrians, bicycles and vehicles being present.

Vehicle access to the site is through the main entrance at the north boundary of the site.

4.4.6 Welfare facilities

The use of site welfare facilities will be available during the works. the site contact will give the locations of these.

The site canteen is located within The Plowright Building, in order to access this each contractor will be required to read additional SOPs and complete an online test (in addition to any site induction and security checks). If this is required then please forward an e-mail address for each contractor to the site contact.

4.4.7 Working hours

Contractors will be able to access site from 0800h – 1900h.

Consideration should be given to the use of temporary lighting requirements if working in poor light.

4.5 Bio Safety Quarantine and Decontamination Requirements

No personnel, vehicles or equipment will be subject to any quarantine restrictions or decontamination process as a result of these works.

4.6 Design Requirements

Detailed design for all mechanical, civil, electrical and control works should be performed.

4.6.1 Design Responsibility

Final design responsibility will always be with the principal designer as appointed by the client.

4.6.2 Standards and Specifications

All equipment should be manufactured, installed, tested and commissioned in accordance with all applicable national and international standards. These should be referenced in any quotation documentation.

Also, the installation works should be fully compliant with the following Pirbright standards:

- E&M-STD-004: Pipework Standard 001
- E&M-STD-005: Pipework Standard 002

4.6.3 Supports and steelwork

Contractor works includes the design, supply and install any necessary supports and steelwork associated with the works.

4.6.4 Documentation

The following documentation should be issued before works commence:

- Design Drawing.
- Data sheets.
- Design calculations, or statements confirming they are not required.
- Relevant safety certificates for equipment being used to perform the works.

4.7 Completion of works

4.7.1 Snagging surveys

On completion of the any installation works, the works must be visually inspected by an appropriate member of the institute engineering team and signed off as complete if acceptable. Any snags identified shall be listed on a project snagging schedule by the site contact and reviewed with the principal contractor before the works are deemed complete.

4.7.2 Inspection, Testing and Commissioning

Any records relating to the inspection, testing and commissioning of an installation should be provided to the site contact.

Were appropriate, witnessing of these by a member of the Pirbright engineering team may be required.

4.7.3 Documentation

The following documentation should be provided following the completion of installation and commissioning works:

- As installed drawings.
- Inspection, testing and commissioning documentation including any certificates.
- Critical spares list.
- Details of planned preventative maintenance requirements of installed equipment.

4.7.4 Waste management

Waste, including spoil created by the works must be removed from site by the contractor and disposed of in an appropriate manner.

Skips must be arranged by the contractor.

Waste transfer notes will be required from the institute for all waste leaving site.

4.8 Project Management Requirements

4.8.1 Contractor Capability

Contractor capability will be reviewed before works are awarded to suppliers.

This will potentially involve:

- Issuing relevant training records of all contractors and managers associated with the works.
- Issuing of relevant company certification (such as ISO 9001, safe contractor etc.). Where certification is not present, documentation showing a satisfactory alternative system is in place should be issued.
- Visits to the suppliers manufacturing facilities by Pirbright personnel.

4.8.2 Project meetings.

Regular project progress meetings will take place with the principal designers and contractors as appropriate.

4.8.3 Project Risk Register

A project risk register will be created by the site contact and will be reviewed at project management meetings.

The risk register should include design, H&S and operational risks and details of mitigation measures taken.

4.8.4 Project Programme

Contractors should give an indication of delivery and installation times associated with the work elements they are quoting for.

Once the project is underway, the site contact will maintain a project programme which will be reviewed at the project management meetings.

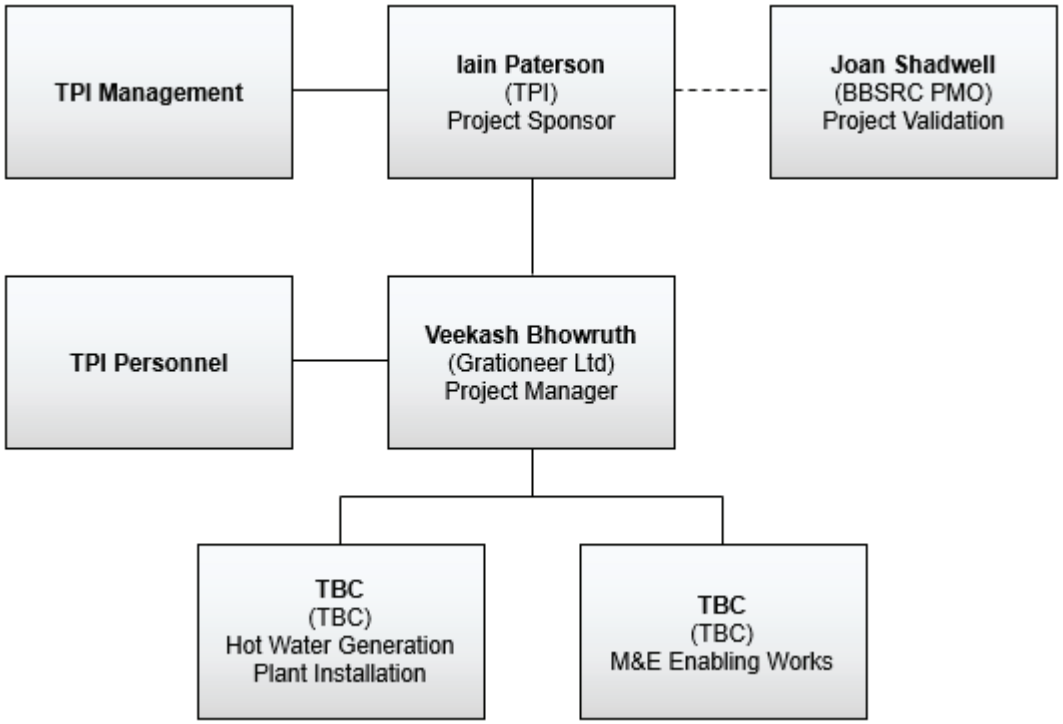
It is envisaged that these works will be completed before the end of 2016. However this is subject to successful finding application and detailed design stage.

4.8.5 Project Co-Ordination

The following activities will ensure project co-ordination:

- Regular project management meetings, primarily between the Pirbright engineer overseeing the works and the principal contractor/designer.
- Regular site checks to see progress and ensure works are taking place in a safe manner.
- Toolbox talks principal contractor to all subcontractors as and when required to highlight any issues they need to be aware of.
- Regular updates from the Pirbright engineer overseeing the works to the Pirbright Engineering Management Team.

4.8.6 Project Organogram



4.8.7 Responsibilities

The responsibilities of each party for these works are as follows:

The Pirbright Institute engineer overseeing works:

- Act as site contact for contractors.
- Create, maintain and issue scope of works document.
- Create and maintain a project risk register.
- Raise purchase orders.
- Co-ordinate the contractor, designers and institute personnel to facilitate works.
- Managing project documentation and budget.
- Facilitate site access.
- Reviewing and agreeing detailed design before works commence.
- Arrange and chair project meetings.
- Responding to contractor queries.
- Arrangement of permits and isolations.
- Ensuring works are performed in a safe manner.
- CDM Client representative.
- Co-ordinating snagging surveys as required.
- Handover to Pirbright Engineering Management.
- Arranging training where appropriate.

Contractors and designers:

- Design responsibility for all installed items.
- Responsibility for installation activities.
- Management of all contractors performing works.
- Ensuring works are performed in a safe manner.
- Highlight H&S and design risks to the engineer overseeing works.
- Supplying all required documentation and information to the institute.
- Ensuring the scope of works is met in full.
- CDM principal Contractor and Principal Designer responsibilities were appropriate.
- Providing Training where appropriate.

Institute personnel:

- Provide information as required.
- Reviewing designer and contractor information as required.
- Reviewing RAMS as required.
- Facilitate works as required.
- Perform isolations required.

- Ensuring works are performed in a safe manner.
- Highlight H&S and design risks to the engineer overseeing works.
- Completing snagging surveys as required.
- Providing escort as required.

5 Particular Requirements

This section describes the particular requirements of each works package of the scope of works.

This is not restrictive or fully detailed and the contractor should provide additional detail where required and suggest alternatives if appropriate.

5.1 Workshop and MOD2 Building Hot Water Generation Plant

The aim of this work is to provide a new hot water generation plant that will allow the Workshop and MOD2 buildings to be taken off steam and allow redundant steam pipework to be removed as part of the demolition works.

It is envisaged that the hot water generation plant will either run from oil or electricity in the form of a fuel oil fired boiler or electric heater/heat pump respectively.

5.1.1 Work Element 2.1 – Hot Water Generation Plant Supply & Install

The aim of this piece of work is to design, supply and install a hot water generation plant. The scope remain open as to what the final solution may be and all proposed solutions will be considered against the following factors:

- Simplicity of solution
- Ease of maintenance and obtaining spare parts
- Energy consumption and future running cost
- Performance of plant during severe ambient conditions (-10°C to 35°C)

Inclusions

- Detailed design work.
- The supply, delivery, offload, positioning, testing and commissioning of a hot water generation plant.
- Additional testing and commissioning of the system when fully connected to the sites utility systems, in co-ordination with the principal designer.
- New heating controls within the MOD 2 building to improve energy and comfort levels.
- Documentation for the above plant.
- Project management of above works.
- CDM requirements associated with above works.

Design Basis

The workshop building currently incorporates a 50 kW steam fed plate heat exchanger system that provides heating to the Workshop building and MOD 2 building via air blowers and radiator circuits.

It is envisaged that this heat exchanger would be replaced with a 50 kW hot water generation plant that will tie in to existing hot water distribution connections.

See the appendices for further details including drawings and photographs.

5.1.2 Work Element 2.2 – Fuel Tank Works

The aim of this piece of work is to install a fuel tank, if the agreed solution requires this.

Inclusions

This work package includes:

- Detailed design work.
- Design, sizing, supply, installation and commissioning of fuel oil tanks and associated fixtures and ancillaries to supply the hot water generation plant supplied by work element 2.1.
- Design, sizing, supply, installation and commissioning of pipework to connect the above fuel tanks to the hot water generation plant tie in point (TP).
- Design, sizing, supply, installation and commissioning of steelwork and supports associated with the above fuel tanks and pipework.
- Documentation for the above plant.
- Project management of above works.
- CDM requirements associated with above works.

Design Basis

The fuel type is envisaged to be Fuel Oil.

It is envisaged that the hot water generation plant will have an installed peak load of approx. 50 kW thermal.

Number and size of fuel tanks should be sized to ensure deliveries are required no more than monthly.

Equipment should be incorporated to ensure that deliveries are triggered automatically.

5.1.3 Work Element 2.3 – Service Connections

The aim of this piece of work is to provide all utility service connections to enable the hot water generation plant to provide hot water to the workshop and MOD2 areas.

Inclusions

- Detailed design work.
- Removal of redundant plant and pipework and preparation of existing pipework for new connections.
- Design, sizing, supply, installation, testing and commissioning of the following pipework including all fittings and ancillary items:
    - Hot water supply and return pipework from the hot water generation plant to any new tanks and existing hot water distribution system.
    - Raw water supply pipework from existing site system to hot water generation plant.
- Insulation of the above supply and return pipework.
- Design, sizing, supply and installation of any required steelwork and supports for the above pipework.
- Design, sizing, supply, installation, testing and commissioning of electrical supply cabling including all bonding and ancillary items from existing site distribution system to hot water generation plant.
- Design, sizing, supply and installation of any required tray / containment and supports for the above cabling.
- Design, sizing, supply and installation of external lighting as required around the new fuel tanks, if proposing oil fired boiler system.
- Any scaffolding requirements for above works.

- Removal of all waste associated with above works.
- Documentation for the above plant.
- Project management of above works.
- CDM requirements associated with above works.

Design basis:

See section 5.1.1.

See the appendices for further details including drawings and photographs that reference the service connections.

5.1.4 Work Element 2.4 – Ground Works

The aim of this piece of work is to complete the necessary groundworks required for this project. Where a fuel tank is referenced, this will only be required if the agreed hot water generation plant requires a fuel tank

Inclusions

- Detailed design work.
- Scanning of the area to identify buried services before works commence.
- Design, sizing, supply and installation of concrete hard standing to facilitate new hot water generation plant.
- Design, sizing, supply and installation of concrete hard standing to facilitate new fuel oil tanks.
- Design, sizing, supply and installation of fencing to create a secure compound around the fuel tanks.
- Design, sizing, supply and installation of trench works associated with the oil pipework from the fuel tanks to the building.
- Removal of all spoil of the above works from site.
- Documentation for the above plant.
- Project management of above works.
- CDM requirements associated with above works.

Design Basis

It is envisaged that the hard standing will need to accommodate 1 x 2,000 ltr fuel oil tanks, however final calculations are required to confirm that this capacity will be sufficient for deliveries to site of no more than monthly.

The Fuel Oil tank compound fence should incorporate 1 x double gate for access and fuel deliveries and 1 x pedestrian gate for emergency escape.

See the appendices for further details including drawings and photographs.

5.1.5 Work Element 1.5 – Project Management

As part of this scope of work, the tenderer is required to include the following project management activities:

- Manage all sub-designers.
- Manage all sub-contractors.
- Deliver tool box talks to all contractors as required.
- Overall commissioning of the installed system.
- Compile all project datasheets, manuals and necessary project documentation
- Ensure project is handed over to TPI, together with any required training

6 CDM requirements

This section outlines the CDM specific requirements of each party.

6.1 Client Brief

This scope document forms the client brief.

6.2 Duty Holders

Client

The client is The Pirbright Institute; represented by Veekash Bhowruth and as such will:

- Appoint the principal contractor and designer in writing.
- Take reasonable steps to satisfy themselves that appointees have H&S skills, knowledge and experience.
- Complete HSE notification if required and display the notification at a location all contractors can see it.
- Update HSE notification if required.
- Provide Pre-Construction information as required.
- Ensure a construction phase plan is drawn up before works commence and ensure it is updated throughout the project.
- Ensure a health and safety file is drawn up before works commence and ensure it is updated throughout the project.
- Take reasonable steps to ensure the principal contractor and designer are fulfilling their responsibilities.

Principal Designer

The Principal Designer for each work package is to be confirmed.

The principal designers will:

- Manage all sub-designers.
- Produce a health and safety file and update it throughout the project.
- Provide pre-construction information as required.
- Fulfil obligations required by CDM regulations.

Principal Contractor

The Principal Contractor for each work package is to be confirmed.

The Principal contractors will:

- Manage all sub-contractors.
- Produce a construction phase plan and update it throughout the project.
- Provide pre-construction information as required.
- Fulfil obligations required by CDM regulations.

6.3 Pre-Construction Information

This scope of works forms the pre-construction information and will be updated and re-issued as appropriate.

6.4 Management Arrangements

Section 4.11 outlines the management arrangements for the project.

6.5 Notification to HSE

If applicable, HSE notification will be done by the client representative.

6.6 Construction Phase Plan

Separate construction phase plans for each work package will be written and issued by the relevant principal contractor. This must be reviewed with the client before any works can begin.

The construction phase plan should include the following sections (relevant sections of this document are also referenced):

- The health and safety aims for the project:
  - See section 4.6 and contractor rules in appendix C.
- The site rules:
  - See section 4.7, 4.8 and contractor rules in appendix D.
- Arrangements to ensure co-operation between project team members:
  - See section 4.11.
- Co-ordination of their work, such as regular site meetings:
  - See section 4.11.
- Arrangements for involving workers
  - See section 4.11.
- Site induction.
  - See section 4.3.
- Welfare facilities.
  - See section 4.7
- Emergency procedures, such as fire and first aid.
  - See section 4.6.
- The control of any of the specific site risks relevant to the.

6.7 Health and Safety File

Each work package should have a health and safety file maintained by the relevant principal designer throughout the project and issued to the client as a standalone document on the completion of works.

It should include the following information:

- Brief Description of the works being carried out.
- Project Risk Assessment.
- Key structural principals.
- Hazardous materials used.
- Information on the future removal of installed plant.
- H&S information about equipment provided for cleaning or maintaining installed plant.
- The nature, location and markings of significant services.
- Information and as built drawings of buildings, plant and equipment.

Appendix A – Drawings

Reference	Title	Version
EM039_SKCH 002	Proposed Sketch for Workshop Heating Upgrade	1

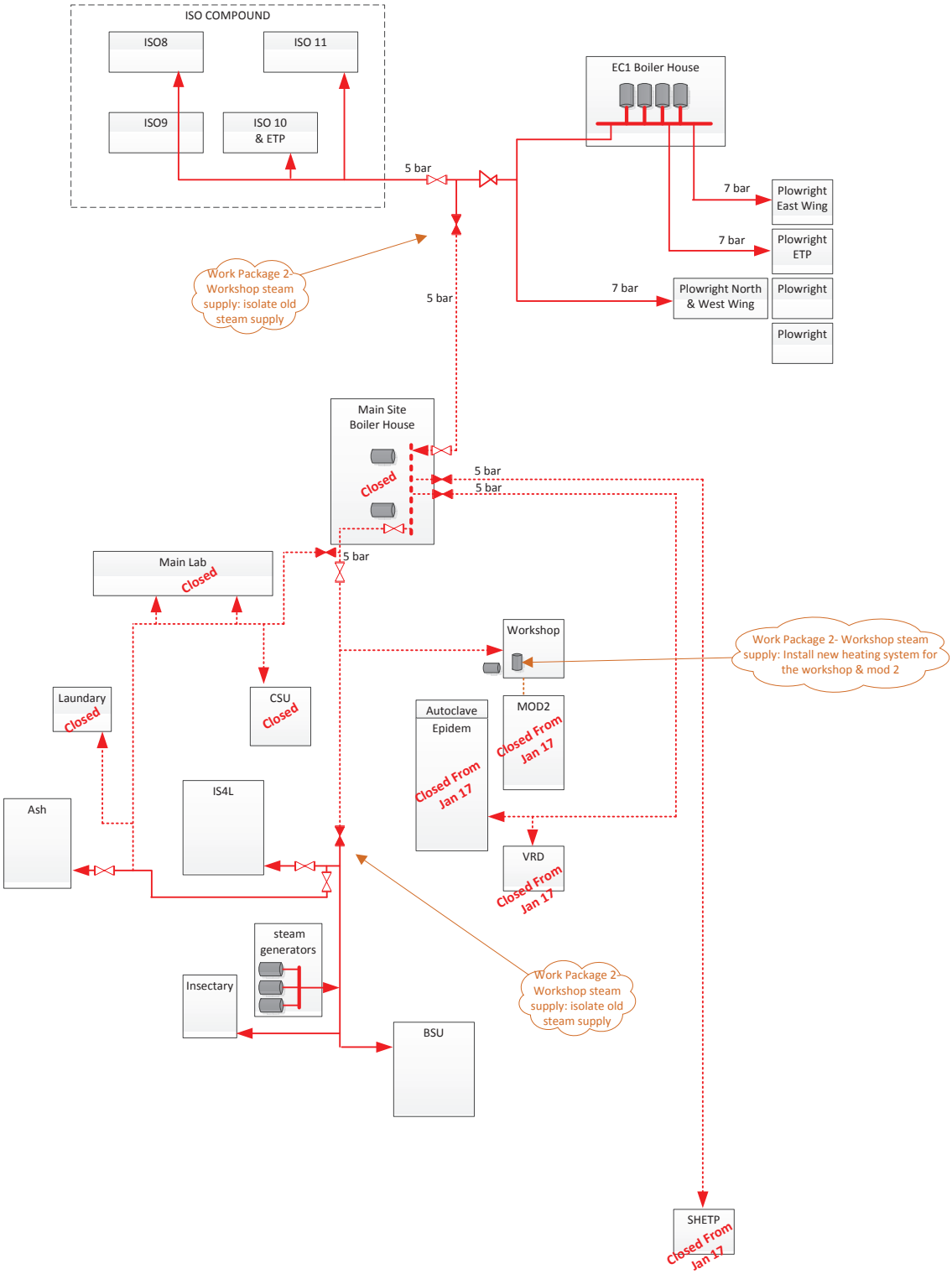
Appendix B – Documents

Reference	Title	Version
E&M-GUIDE-052	Pirbright Institute Contractor Site Rules	2-B
BC16-058_ Workshop Heating Photos	Location Photos	
To follow when completed	*Steam Pipe Work Asbestos Report*	

Appendix C – Standards & Specifications

Reference	Title	Version
E&M-STD-004	Pipework Standard 001	2
E&M-STD-005	Pipework Standard 002	1 – A

Workshop Steam Supply Scope Sketch



Site Rules for Contractors

Introduction and Definitions

Introductory Statement

The Pirbright Institute has a statutory and moral duty to ensure, so far as is reasonably practicable, the health and safety at work of all its staff and to ensure that activities undertaken by the Institute and those it employs, do not endanger others.

The Pirbright Institute's Estates and Facilities Department recognises these duties and also that specific arrangements will have to be made from time to time to cater for special risks, either of a permanent or temporary nature. In view of the many and varied activities carried out by Contractors on the Institute premises, these site rules have been introduced to ensure the safety of the staff, students, Contractors and any other visitors on site.

The Pirbright Institute will as far is as reasonably practicable ensure that all Contractors engaged to carry out work are competent and will encourage good safety practices. The Institute will plan, co-ordinate, control and monitor the activities of Contractors to minimise the risks presented to staff, students, Contractors, and other persons on site.

All Contractors are required to observe the procedures laid down in these site rules and to ensure that their supervisors and employees on site are familiar with its contents. In addition, Contractors are required to sign a declaration to say they have read the document and agree to abide by this requirement and return it to the Estates and Facilities Department (or their Contractor Host) before any work commences.

Purpose of the Site Rules

These rules have been prepared to assist Contractors and their employees to work safely and to prevent accidents and injuries to them and to Pirbright Institute staff, students and visitors to site. It also aims at assisting Contractors in complying with the Health and Safety at Work Act 1974 and any subsidiary regulations and other statutory provisions.

All Contractors working on Institute premises must conform to the provisions of these site rules. The site rules do not in any way relieve the Contractors of their legal or contractual obligations. All Contractors and their employees should be conversant with the Safety and Biosecurity Rules of the Department or Area in which they are working and the Contractor's senior on-site representative is responsible for ensuring that this is so.

In any case of doubt regarding the application of the site rules, or in any way circumstances affecting safe working not covered by the site rules, advice should be sought from the Contractor's Contractor Host, from whom additional copies of the site rules may be obtained and clarification given.

Definitions and Abbreviations

'Institute' The Pirbright Institute, Pirbright Laboratory, Ash Road, Pirbright & The Pirbright Institute Compton Laboratory, Compton.

The 'Contractor Host' is any nominated person within the Pirbright Institute acting on its behalf, who has arranged for the Contractor(s) to attend site to carry out activities; is responsible for the coordination of their activities whilst on site.

The 'Contractor' where used in this document, should be taken to include the Contractor's employees and those of any engaged sub-contractor.

'Normal working hours – Monday to Thursday, 8.30am – 5.00pm Friday 8.30am – 4.30pm

Appointment and Insurance

Appointment of Contractors

The Contractor **must** inform the Pirbright Institute of the intention to use sub-contracted staff prior to work being undertaken.

The Contractor **must** ensure any sub-contracted staff comply with the requirements set out in this document and all other Institute Policies and SOPs that are relevant to the work being undertaken.

It is the Contractor's responsibility to ensure that any individual employed to work on their behalf fully understands and adheres to the standards set out in this document. The Contractor must ensure that any such individuals are aware of the nature and scope of the work and that they are competent to undertake such work.

Institute Policies and Procedures

The Institute has a number of policies and procedures that must be adhered to when working on Institute premises, the following is not an exhaustive list of procedures which may apply:

- BSEC-REG-02: Pirbright Institute Biorisk Overview.
- BSEC-REG-04: Access Control at the Pirbright Institute Laboratory
- BSEC-Reg-06: Procedure for the transfer of equipment, tools and effects into and out of the Restricted Area with special Reference to visiting Equipment Engineers.
- BSEC-Reg-10: Quarantine rules following entry to the Pirbright site.

The Contractor must ensure any sub-contracted staff comply with the requirements set out in these documents and any other Institute Policies and SOPs that are relevant to the work being undertaken, if you are unsure as to which may apply speak to your Contractor Host.

Insurance Requirements

It is the policy of the Pirbright Institute to maintain a high standard of health and safety in all of its undertakings; Part of these procedures we require all Contractors carrying out work on our premises to comply with both statutory requirements and the Code of Practice contained herein.

The Pirbright Institute insist that Contractors working on any of our premises must have the following insurance in place as a minimum requirement:

- Employers Liability (minimum limit of £5 million is required by law)
- Public/Products Liability (with a minimum limit of £5 million)
- Contractors All Risks Insurance (where applicable)

Copies of insurance certificates are required by the Estates and Facilities Department Office before Contractors are allowed to work on site.

Planning and Risk Management

Planning

The scope of work to be undertaken by the Contractor should be clearly defined. Should there be any doubt as to the scope of work clarification should be sought from your Contractor Host prior to starting work.

The Contractor is required to conduct & provide relevant risk assessments and method statements for all jobs to be undertaken, these to be submitted to their Contractor Host at least 5 working days prior to commencement of the job. A Safe System of Work is also required for activities which present a significant hazard and a more detailed assessment is required. It is the Contractor's responsibility to ensure that a Safe System of Work is followed at all times.

If the Contractor considers, at any stage, that any work is necessary out of normal working hours then sufficient notice of this must be provided to their Contractor Host for agreement of the arrangements.

The following activities need authorisation, which may be in the form of a formal permit to work, issued to the Contractor from their Contractor Host:-

- Work at height;
- Entry into any confined space;
- Hot work i.e. work involving the potential of fire e.g. welding, cutting, grinding etc;
- The Erection and striking of scaffolds of scaffolds, fixed or Mobile;
- Work involving any excavation or creation of opening; A proven and suitable method of scanning the ground for services must be undertaken prior to digging taking place and excavations must be shored if the ground is considered unstable. The excavation must be risk assessed on a continuous basis.
- Work involving the use of highly flammable liquids or gases or the use of gas cylinders;
- Work involving the use of any toxic or carcinogenic substance, any biological agent or larger volumes of any substance hazardous to health or where there is significant risk to health;
- Live electrical work;
- Work involving the removal of any safeguarding system from any machine or work equipment;
- Work involving or likely to involve the disturbance of asbestos;
- Work likely to involve high noise levels;
- Work involving mechanical lifting equipment or
- Work in any laboratory or laboratory area
- Work in any restricted area
- Work on any bio-containment system

No live working on electrical system permitted, the exception to this will be fault finding by those who have received suitable training and are qualified to do this. No single person working on live system.

If the Contractor is in any doubt as to whether any of the above are applicable this must be discussed with their Contractor Host.

Risk Management

The Contractor must ensure there are effective arrangements for safeguarding staff, students, sub-contractors, suppliers and visitors. This will include carrying out a suitable and sufficient risk assessment and if significant, a copy given to the Contractor Host.

A sub-contractor must not sub-contract anything out without informing the original Contractor.

Dust

The Contractor must take all reasonable precautions to limit and contain dust when working inside buildings.

Asbestos

The Pirbright Institute has taken a number of steps to ensure that Contractors will not encounter asbestos this includes:
The labelling of Asbestos Containing Materials in certain areas.

An Asbestos Register available in electronic and hard copy format.

A signing procedure indicating the Asbestos register has been checked.

However the possibility may arise where Contractors unexpectedly encounter material they suspect to be asbestos: they should stop work immediately and inform their Contractor Host for further guidance before work can continue.
Prior to any construction work being undertaken and if the building is on the Asbestos register then a pre-construction survey will be undertaken.

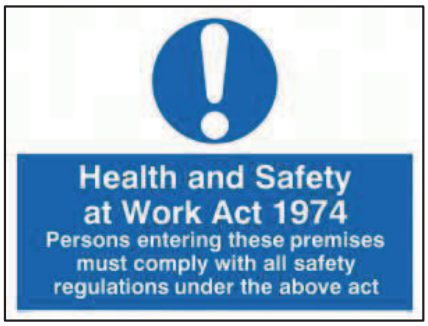
Statutory Duties & Services

Statutory Duties

All Contractors must carry out their works in accordance with the appropriate legislation.

The following is not an exhaustive list of the legislation which may apply:

- Health and Safety at Work Act 1974
- Electricity at Work Regulations 1989 (and IEE Code of Practice)
- Workplace, (Health, Safety and Welfare) Regulations 1992
- Provision and Use of Work Equipment Regulations 1998
- Lifting Operations and Lifting Equipment Regulations 1998
- Control of Substances Hazardous to Health Regulations 2002 (COSHH)
- Working at Height Regulations 2005
- Control of Asbestos Regulations 2012
- Management of Health and Safety at Work regulation 1999 (amended 2006)



Services

Services such as electrical systems, compressed air systems, water, drainage, industrial gasses, air or ventilation systems, air conditioning, BMS, fire alarm, air pressure alarm systems, access control systems must not be interrupted without the prior permission of the Contractor Host.

All work must be carried out to a programme agreed by the Estates and Facilities Department trained and authorised personnel.

Appropriate Regulations and Codes of Practice (especially for gas and electricity) must be followed.

Use of live Institute services shall be allowed by the Contractor only by prior written agreement from their Contractor Host.

Tools & Equipment

Tools and Equipment

All tools and equipment necessary for the contract will be provided by the Contractor. No Institute plant, equipment, or apparatus shall be borrowed by the Contractor unless there is written approval from their Contractor Host.

The Contractor's tools and equipment must be in good condition and appropriate for the job.

It shall be the Contractor's responsibility to ensure that all personnel who use any tools or equipment are adequately trained and competent.

The Contractor's tools and equipment must be kept secure at all times and not loaned to any Institute employees or students.

The Institute accepts no responsibility for the safe keeping of or the loan or damage to, any tools or equipment of the Contractor.

Ladders and other Access Equipment

All such work must comply with standards laid down in the Working at Height Regulations 2005 and any current HSE Guidance Notes. Unsecured ladders should only be used for inspection purposes and footed at all times.

All gangways and working platforms must be properly protected.

The Contractor should ensure that their ladders and stepladders are regularly inspected, properly secured / footed when in use and be Industrial Class 1 (Heavy Duty Type).

Electrical Equipment and Working

Use of live Institute services shall be allowed by the Contractor only by prior written agreement from their Contractor Host

All electrical work to be undertaken by the Contractor will be carried out by qualified Electricians in accordance with the IEE and Statutory Regulations.

It is a requirement that portable electrical hand tools to be used by the Contractor shall be rated at 110 volts or below, and supplied from a transformer which will have a centre tap to earth.

All electrical cables and equipment must be in good condition, and must be inspected regularly by the Contractor to ensure that defective or damaged equipment is repaired or replaced.

The Contractor should ensure that cables are protected from accidental damage, especially when they extend beyond the immediate work site, and must not present a hazard to pedestrians or vehicles.

The Contractor should ensure that all lights are switched off whenever the area is vacated unless health and safety is compromised.

Any other electrical equipment that is used by the Contractor must be switched off if possible whenever the area is vacated.

Electrical equipment brought to site for use must be supported by the relevant certification.

Test certification shall be provided for all electrical installations.

PPE & Site Housekeeping

Personal Protective Equipment (PPE)

The Contractor is responsible for providing its own employees with personal protective equipment (PPE) as may be required for the work in hand, for example, eye protection, head protection, respirators and breathing apparatus, etc.

The Contractor must also ensure that if a type of PPE is described as a control measure in any risk assessment that the person/s undertaking the work wear the PPE at all times.

The Institute will provide any specialist equipment that may be required when working in specific areas, for example, lab coats, disposable gloves when working in a laboratory area.

All Contractors will be required to wear high visibility jackets whilst working on Institute sites or suitable high visibility equipment for the working location.

Site Housekeeping

If any goods are to be delivered to the Institute for the Contractor's use, then prior warning must be given to the Contractor's Contractor Host. Goods should state the Institute contract order number, the Contractor's name and their Contractor Host.

It is the Contractors sole responsibility to ensure that materials and equipment are safely, securely, and neatly stored while on site. In no cases must they block gangways, roadways or exits.

All equipment and materials used at the Institute must conform to the relevant British Standard and be installed according to the manufacturer's instructions.

Breakages of glass e.g. windows or light bulbs/fluorescent tubes must be reported promptly to their Contractor Host.

Building work: Prior to commencement of any work which generates building dust, and or liquid waste, an assessment must be carried out by the Contractor, their Contractor Host and area user representative or member of the Health and Safety Department, to determine the potential contamination risk and suitable working practices agreed with the Contractor in writing.

Site Housekeeping, Waste & Pollution Prevention

Waste and Pollution Prevention

No harmful or polluting substances may be discharged into the drains or unsurfaced ground. In the event that contamination does occur, the Contractor's Contractor Host and the Institute Environmental Advisor must be informed immediately.

Where a project or activity presents a risk of pollution, the Contractor must show that risk has been mitigated via a risk assessment. If liquids for example paints, oils or petrol are being used spill kits must be provided and a means of safe disposal identified.

Plant such as generators or pumps which are fuel driven must be bunded or have a built in bund system.

Disposal of waste is the responsibility of the Contractor. The Contractor is not permitted to use any Institute bins or skips for the disposal of waste associated with the project or activity, unless written authorisation is received from the Contractor's Contractor Host.

If working in containment then the waste generated must be clearly segregated and bagged accordingly, the Institute will arrange the necessary treatment of this waste once the work is completed or during the works if the project is extensive.

It is the Contractor's responsibility, under the Environmental Protection Act 1990, to ensure that your waste is:

- handed to a licensed waste carrier;
- accompanied by a waste transfer note
- disposed of at a licensed or exempt recycling/transfer facility or landfill.

Where a project or activity produces Hazardous Waste as defined by the Hazardous Waste Regulations, 2005 it is the responsibility of the Contractor to dispose of the waste. The Contractor will identify the appropriate SIC code as producer and request the Institute premise code from the Environmental Advisor prior to disposal. A hazardous waste consignment note must be completed when handing waste to a carrier. Copies of all waste handling paperwork to be given to TPI host on completion for audit records.

Facilities, Hygiene and Conduct

Site Facilities

Welfare facilities may be available for Contractor use. The Contractors Contractor Host will inform the Contractor of their location. These facilities must be respected at all times; no dirty clothing to be worn at any time! Further to this, the facilities must be left in a clean condition after use.

Temporary or portable buildings for use by the Contractor will only be allowed by prior written agreement with their Contractor Host. Mains services will not normally be provided.

The Contractor must at all times comply with Institute notices and statutory signage.

Personal Hygiene

The Contractor must follow Institute procedures with regards to hygiene; in particular when working in laboratory areas, hands must be washed prior to leaving the area.

Smoking is not permitted on the Institute Premises except in specially designated areas.

Food and drink must never be taken into work areas, and must only be consumed in the canteen area or site welfare cabins.

No alcoholic drinks are to be consumed or brought onto the Institute premises.

Conduct

The Contractor must ensure that their employees behave in a courteous manner when working on Institute premises. Bad language, unnecessarily raised voices and language or behaviour that could be offensive on the grounds of age, physical appearance, gender, sexuality, disability, ethnicity or religion are all forbidden.

Care should be taken to ensure that access routes, **for example dropped kerb, needed for disabled access and egress are not blocked by vehicles, skips, plant or materials.**

Radios or other media devices are not permitted on site.

Examples of unacceptable conduct are:

- verbal abuse, or insulting behaviour
- sexist jokes, racist jokes, jokes about an individual's sexual orientation or jokes about disability
- unwanted physical contact ranging from touching to serious assault
- display or circulation of sexually suggestive or racially abusive material
- bullying, coercive or menacing behaviour
- ridicule or exclusion of an individual for cultural or religious differences
- obscene slogans on T-shirts

Any Contractor who causes offence by his/her actions or creates an unsafe situation may be prohibited from the Institute estate and may be required to leave immediately when instructed by the Contractor Host or a member of the Estates and Facilities Department.

Incidents, Accidents & Vehicles on Site

Incidents and Accidents

The Contractor must ensure all accidents, however minor, are reported to their Contractor Host immediately. Further to this if the accident is serious it must be reported to the Institute Security staff located at the Security Gatehouse at each site; either by radio, telephoning 1000 from an Institute telephone or 01483 231200 from a mobile phone, if on the Pirbright Laboratory Site; or if on the Compton Laboratory Site either by radio, telephoning 2600 from an Institute telephone or 01635 579375 from a mobile phone; as per the Institute Emergency procedures.

This report does not, however, remove the Contractor's legal obligations to report relevant accidents or incidents to the Enforcing Authorities, as required by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013

First Aid boxes are available in a number of locations for emergency use. A number of personnel with a current First Aid certificate have access to the First Aid Boxes - their names are displayed in prominent locations.

However, where work is carried out on a site, it is the Contractor's responsibility to provide First Aid boxes and where applicable suitably trained personnel as identified by the Contractor's First Aid Assessment.

Vehicles on Site

Driving of any vehicles by the Contractor on Institute premises shall be undertaken with due care and attention and within the speed limits as indicated, following all direction signs. The Contractor shall be considerate to other road users, and particular care should be taken with regards to pedestrians on site who should be given priority at all times and in particular at marked crossing points.

Vehicles belonging to the Contractor shall be parked in the designated parking bays, exceptions shall be for loading/unloading and arranged with your Contractor Host. No vehicle shall be left unattended whilst unloading/loading.

The Contractor must ensure that fire exits are kept clear at all times!

When reversing, the Contractor must ensure all large goods vehicles and plant are watched by and under the control of a banksman.

It is not permitted to use a mobile phone whilst driving a vehicle on Institute premises.

Any incidents involving damage by the Contractor to property or causing injury no matter how minor must be reported to the Institute Security Staff and their Contractor Host as soon as practicable after the event.

Fire and Fire Alarm System

Fire and Fire Alarm System

The Contractor must make themselves fully aware of and adhere to, the fire and evacuation procedures in operation within the Institute.

It is the Contractor's responsibility to satisfy themselves that their work creates no fire or explosion risk.

Fire doors and smoke stop doors may only be propped or wedged open by the Contractor for the immediate passage of plant and materials and with personnel in attendance to close if necessary. Under no circumstances are fire doors to be permanently wedged open.

Where it is intended to carry out any work on any exit route, the Contractor must inform their Contractor Host in advance, and gain approval before commencement.

Where Contractor's work requires breaking fire separation, particularly in occupied buildings, this must be kept to a minimum and the breach made good as soon as is practical. Where permanent reinstatement is not practical in the short term, temporary means must be used such as the use of intumescent pillows, temporary fire screening, etc.

Heat detectors, smoke detectors and portable extinguishers are installed in most areas throughout the site.

Prior to the start of any works, the Contractor shall liaise with their Contractor Host and the Estates and Facilities Department, Health and Safety/Risk Supervisor to ensure that the works do not affect the system functionality or in any way reduce the effectiveness of the system. Any alteration or amendments to the fire alarm system shall be recorded in the Institute fire logbook. Any additions to the fire alarm system are to be provided on the Contractor's Operating and Maintenance Manuals.

The Contractor carrying out work in these areas must be agreed in advance with their Contractor Host. An isolation permit must be issued if the fire alarm is to be isolated for any reason. The permit must be closed at the end of the working day or alternative means put in place for adequate building protection

Any cable/equipment damage or false alarms caused by the Contractor's failure to comply with this requirement shall result in the Institute seeking costs for such damages or business disruption as it deems appropriate.

Where there is a dust explosion risk, any work by the Contractor to be carried out in these areas must be agreed in advance with their Contractor Host.

Procedure in the Event of Fire

Raise the alarm immediately in the event of a fire, by hitting the nearest fire alarm call point or calling the emergency number.

On hearing the fire alarm the Contractor must stop work immediately and follow the fire evacuation procedure leaving the building by the nearest safe exit route and then proceed to the closest fire assembly point. Once at the fire assembly you must wait for further instructions from a member of The Pirbright Institute's staff.

The Contractor must close all doors behind themselves and Must Not use lifts.

The Contractor is not to return to work or re-enter any building until instructed it is safe to do so by the Fire Warden in attendance.

Security and Access

Security

The Institute runs an 'Approved Contractor' scheme whereby all Contractors working on the Institute premises must undergo a security screening prior to gaining authorised access to the Institute; all individuals must consent to, and subsequently complete the screening process to work at the Institute.

In addition to the screening process mentioned above all individuals must successfully complete an induction/training programme to gain access to Restricted Areas or areas subject to quarantine restrictions.

The Contractor must provide photographic identification to gain access to the Pirbright Institute site; this will be checked at the security gatehouse upon arrival at site; all individuals that are not an 'Approved Contractor' will be issued with a temporary visitor pass, this pass and any 'Approved Contractor' pass must be worn visibly at all times whilst on site.

All Contractors must at all times sign in at the Contractor Office once they have been granted access through the gatehouse, and also sign out prior to leaving site.

The Institute reserves the right to search any vehicle, person or property entering, leaving or present on Institute premises, the Contractor will be deemed to have consented to this requirement prior to arrival at The Pirbright Institute.

No photographs can be taken of any part of the site, or any equipment on the site, without written permission from the Head of Security.

Contractors are not authorised to be in any other part of site apart from that area they have been authorised to work in.

Upon any reasonable request, the Contractor must comply with any instruction given by the Institute Security Department.

Acceptance Form

This form must be completed and signed by every Contractor prior to undertaking any construction, maintenance or other similar works on The Pirbright Institute estate.
The completed form should be sent to:

The Pirbright Institute
Estates and Facilities Department
Ash Road
Woking Surrey
GU24 0NF

I/we have received a copy of the Institute's Site Rules for Contractors undertaking work on the Institute estate.

I/we have read and understood the Rules referred to above and briefed our employees of the requirements and contents.
I/we agree to comply with all current legislation governing construction works and associated activities and the specific rules and procedures detailed in the Institute's Site Rules.
I/we understand that any contravention/breach of relevant health and safety legislation and the specific rules and procedures detailed in the Institute's Site Rules may lead to termination of the contract and removal from the Institute's approved list of Contractors.

Signed:

…….

Designation:

…….

On behalf of:

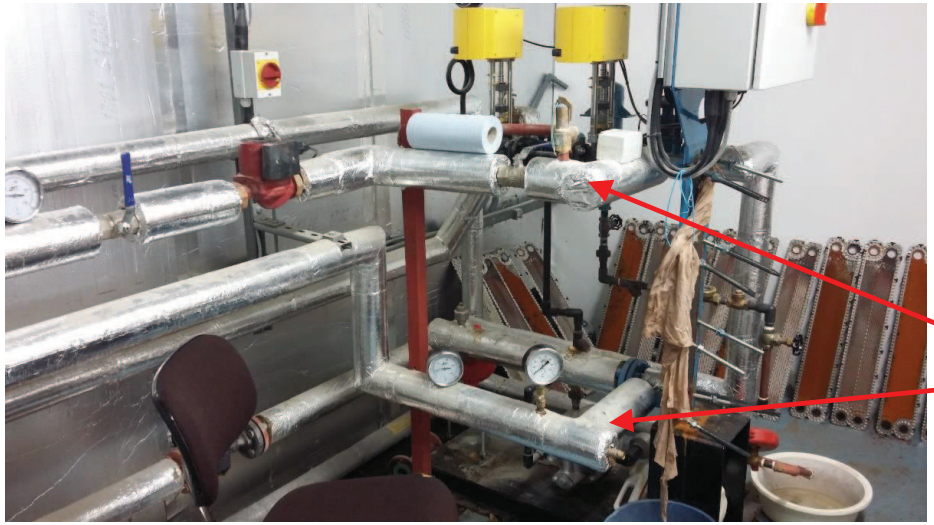
…….

Dated:

EM039 – Workshop Heating Photos

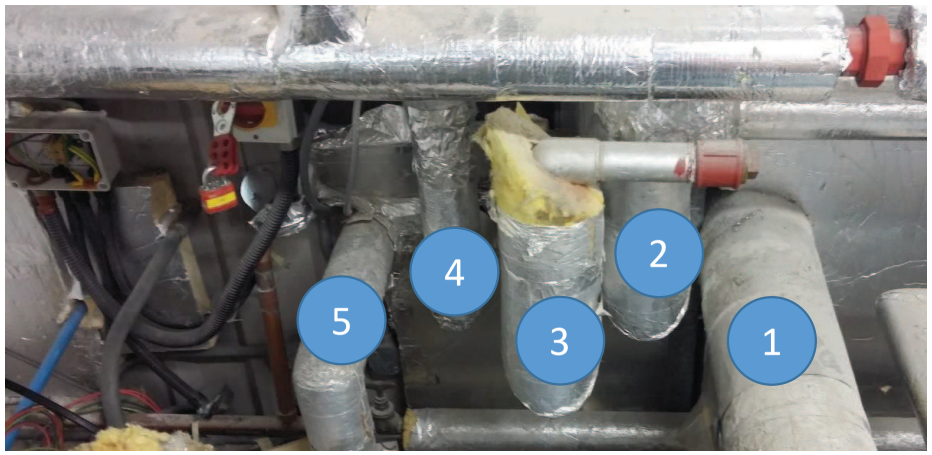
Hot water supply and return pipework to/from the new hot water generation plant to run along this wall towards the hot water distribution tie in points

Redundant air blast cooler to be removed and new hot water generation plant to be installed in its place



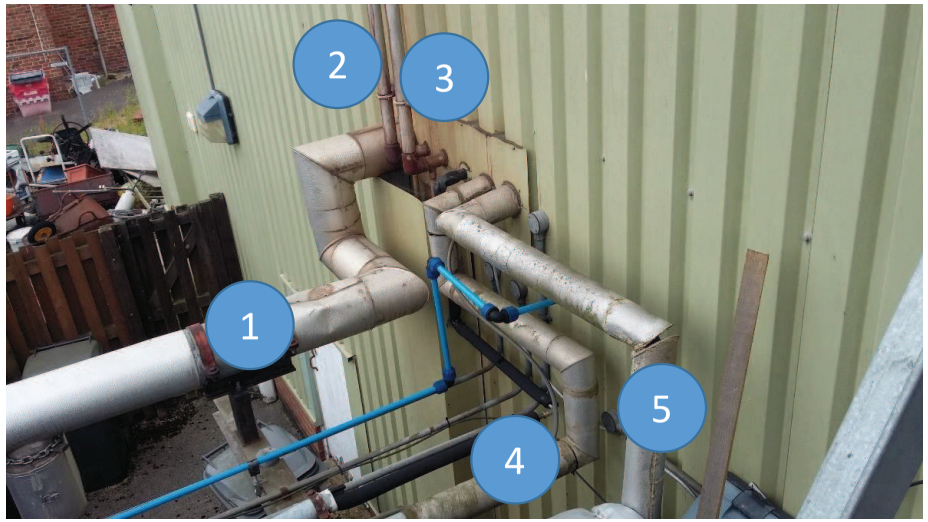
The steam hot water generation plant is to be removed from the plant room together with all pipework and fittings. This does not include the hot water distribution pipework.

These are the tie in points to the hot water distribution and will be retained/reworked as part of the project to continue to supply hot water to users from the new hot water generation plant



Remove pipe work labelled 1 – 5 from the plantroom to agreed point outside the building and make safe

For information:
1 – Steam Main
2 – Pressure Relief Vent
3 – Redundant Pressure Relief Vent
4 – Condensate Return Main
5 – Pipe without connection in plant room



Pipe work 1, 4 & 5 should be isolated safely at the closest point to the building before any removal works are carried out.

STANDARD
Pipework Standard 001

Suitable pipework contents:

Pipework contents	Notes
Saturated Steam < 10 bar(g)	Above ground. Non-flameproof area.
Condensate pressurized <10 bar(g)	Pipework between steam trap and condensate return vessel

Relevant Standards:

Pipework: ASME B31.3 – 2002 – Process Piping
Pressure Equipment Directive 97/23/EC
Testing: BS EN13480 – Metallic Industrial Piping
Welding: Welders used for manufacturing or installation must have completed and passed a test in accordance with BS EN 287.

Pipework, valves and fittings:

Item	Size range	Description	Notes
Pipe	½" – 2" DN15 – DN50	Carbon steel API 5L GR B seamless XS (schedule 80 pipe)	
	2 ½" – 24" DN65 – DN600	Carbon steel API 5L GR B seamless Std. Wt. (schedule 40 pipe)	
Fittings	½" – 24" DN15 – DN600	Butt weld, wrought carbon steel ASTM A234 GR WPB seamless. Dimensions to ASME B16.9. Thickness to match pipe.	Use pulled bends (Rad 5D) for 2" NB and below. Where dimensions are limited, butt weld fittings shall be used. Screwed may be used up to 2" NB when agreed with the site engineer.
Flanges	½" – 24" DN15 – DN600	Weldneck, ASME B16.5 class 150# RF. Carbon steel ASTM A105N.	Other flange standards e.g. BS10, PN16, BS1560 FF etc. Installed only where required by mating equipment and when agreed with site engineer.
	½" – 24" DN15 – DN600	Blind, ASME B16.5 class 150# RF. Carbon steel ASTM A105N.	Other flange standards e.g. BS10, PN16, BS1560 FF etc. Installed only where required by mating equipment and when agreed with site engineer.
Gaskets	½" – 24" DN15 – DN600	Class 150#, inside bolt circle (ring type). Graphite laminated with tanged stainless steel sheet reinforcement, flat ring type inside bolt circle, 1.5mm thick, dimensions to ASME B16.21	
Bolting	½" – 24" DN15 – DN600	Alloy steel heavy hexagon head machine bolt. Zinc plated. Threaded full length with one zinc plated heavy hexagon series threaded nut. ISO metric coarse thread. ASTM A193 GR B7 bolt with ASTM A194 GR 7 nut.	Washer of compatible material to be placed under nut.
Ball valves	½" – 1 ½" DN15 – DN40	3-piece, antistatic Carbon Steel body & end connectors. 316L Stainless Steel ball. TFM self-relieving seats & seals, graphite gland packing (not on 3-way valves). Butt weld to suit pipe.	
	2" – 8" DN50 – DN200	1-piece body. Firesafe & antistatic. Carbon steel body ASTM A351 CF8M. 316L stainless steel ball & trim. TFM self-relieving seats & seals, graphite gland packing (not on 3-way valves). Flanged ends to ASME B16.5 150# RF.	
Gate valve	2" – 12" DN50 – DN300	Bolted bonnet. Carbon steel body ASTM A216 WCB, 13 chrome trim. Solid wedge. Graphite gland packing. 150# flanged ends to ASME B16.5 RF.	
Globe valve	2" – 6" DN50 – DN150	Bolted bonnet. Carbon steel body ASTM A216 WCB, 13 chrome trim. Stellited seat and disc. Renewable disc. Graphite gland packing. 150# flanged ends to ASME B16.5 RF.	
Parallel slide	1" – 1 ½" DN25 – DN40	Bolted bonnet. Cast carbon steel body and bonnet ASTM A216 WCB, stainless steel stem. Nickel alloy trim. Graphite gland packing. 300# flanged ends to ASME B16.5 RF.	
	2" – 12" DN50 – DN300	Bolted bonnet. Cast carbon steel body and bonnet ASTM A216 WCB, stainless steel stem. Nickel alloy trim. Graphite gland packing. 150# flanged ends to ASME B16.5 RF.	
Needle valve	½" DN15	Needle valve for isolation, calibrating and venting with stainless steel 316 S16 body, spindle and handwheel. Hard seat. PTFE seal. BSP taper female ends.	For instrument isolation, calibration and venting only. Combine with ball valve if necessary.
Check	2" – 6"	Swing type check valve. Bolted cover. Carbon steel body, disc	

swing	DN50 – DN150	and cover ASTM A216 WCB. 13 chrome trim. 150# flanged ends to ANSI B16.5 RF.	
Check spring	½" – 4" DN15 – DN100	Wafer spring loaded "disc" type check valve. AISI 316 stainless steel body, internals and spring.	

Branch table:

	HEADER																
BRANCH	**NPS**	**24**	**20**	**18**	**16**	**14**	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1 ½**	**1**	**¾**	**½**
	½	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT	BWT	BWT
	¾	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT	BWT	
	1	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT		
	1 ½	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT			
	2	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT				
	3	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT					
	4	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT						
	6	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT							
	8	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT								
	10	SOB	SOB	SOB	SOB	SOB	SOB	BWT									
	12	SOB	SOB	SOB	SOB	SOB	BWT										
	14	SOB	SOB	SOB	SOB	BWT											
	16	SOB	SOB	SOB	BWT												
	18	SOB	SOB	BWT													
	20	SOB	BWT														
	24	BWT															

NPS: Nominal Pipe Size in Inches.
SOB: Set On Branch.
BWT: Butt Welding Tee.

Thermal insulation:

	Pipe size (NB)											Flat surfaces & vessels
	½"	¾"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	
	Thickness (mm)											
0 to + 185 C Rockwool	40	40	50	60	60	70	70	80	90	90	100	60
Aluminum cladding	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.6
Stainless steel cladding	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.5

A minimum clearance of 25 mm must be left all around a completed insulated pipe.

All insulated pipework must be supported on insulated blocks the same size as the required insulation thickness. Supports or brackets must be no closer than 30mm to the outside edge of the insulating block.

Supporting Spans:

The maximum pipe span in metres for standard wall carbon steel pipe should be as follows:

Pipe size (NB)	½"	1"	1 ½"	2"	3"	4"	6"
Max pipe span (m)	2	3	3	3.3	4.8	5.7	7.6

Supports should be designed to allow adequate movement for thermal expansion of pipework.

Hydrostatic Testing:

All pipework subject to operating pressures in excess of 0.5 barg should be hydrostatically tested to 1.5 times the design pressure of the system unless it is impractical or undesirable for process/safety reasons to do so.

The design pressure of the system is the maximum possible pressure due to a protective device (e.g. relief valve set pressure) or the maximum service pressure x 1.1 (whichever is lower).

For modifications and repairs to existing pipework that has already been proven to be adequately strong either by previous testing or by an appropriate period of satisfactory service, either:

- The whole installed system should be hydraulically tested in situ.
  Or
- The modified section should be strength tested in the workshop and then assembled. Further strength testing is not required if the connections are flanged. If the final connections are welded then the system should be hydraulically tested in situ. This may be waivered on the written permission of the Site Engineering Operations Manager following at least a visual inspection and proof of NDT certification.

Strength testing should be carried out in accordance with the requirements of BS EN 13480. Steam & Condensate services over 9 barg & 290 °C and all boiler pipework should be pressure tested should be conducted in accordance with BS 806.

Before testing begins, all components in the system must be checked to ensure they can withstand the test pressure (isolating or removing as appropriate if acceptable to do so).

Certification of strength testing should be provided by the supplier.

Testing should not be performed below 7 °C ambient temperature.

Water is the preferred testing medium, if not practical then another fluid can be used.

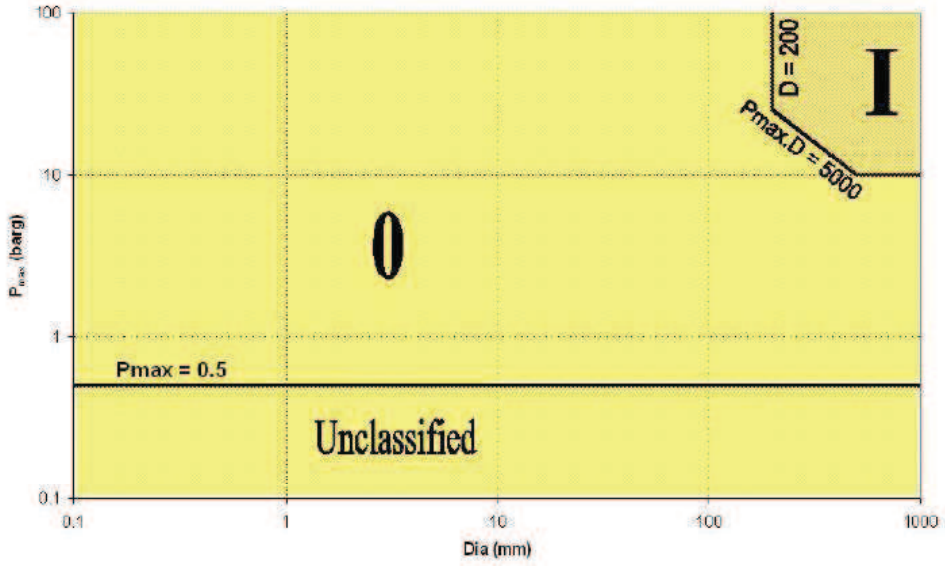
The test pressure should be raised incrementally in steps of not more than 10% of final test pressure or 1 barg (whichever is the lower increment) and the system checked for pressure loss over a specified period of no less than 5 mins at each increment. When the final test pressure is reached it should be held for at least 30 minutes. Testing should be witnessed by PIR or the PIR representative and their signature should be included on the test certificate.

Nondestructive testing:

The standard for testing of completed metallic pipework sections is BS EN 13480 and aligns with the Pressure Equipment Directive in terms of categories and definitions.

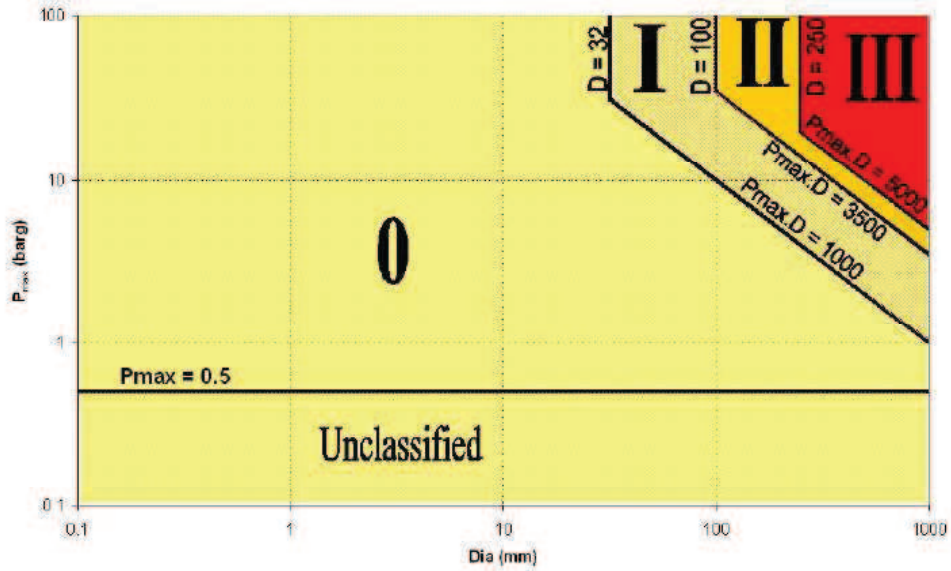
Steam & Condensate up to 0.5 barg is considered a group 2 liquid.

The classification for this pipework can be found from the following table:



Steam & Condensate above 0.5 barg is considered a group 2 gas.

The classification for this pipework can be found from the following table:



Note for the above graphs:

The Pmax is the maximum possible pressure due to a protective device (e.g. relief valve set pressure) or the maximum service pressure x 1.1 (whichever is lower).

In that the pipe size vs Pmax coincides with a division between two classes, then the lower class applies.

The classification of the pipework defines what NDT is required as per the following table:

Pipe Class	Visual examination	Butt Welds	Branch Welds >100mm		Socket/Fillet Welds Seal Welds	
		RT/UT	MT	RT/UT	MT	RT/UT
Unclassified/0	100%	0%	0%	0%	0%	0%
I	100%	5%	0%	0%	0%	0%
II Steam/Condensate	100%	25%	0%	25%	0%	10%
III Steam/Condensate	100%	100%	10%	100%	10%	10%

RT = Radiographic Testing:

Class III welds: carried out in accordance with EN 1435:1997 Class B.
Class I or II welds: carried out in accordance with EN 1435:1997 Class A.
All welds for testing should be numbered and marked on pipework in indelible pen.
The acceptance criteria are defined in EN 12517:1998 acceptance level 2 and additional requirements of EN 13480-5:2002 table 8.4-3.
Testing should be carried out by persons qualified to at least EN 473:2000 Level 1, supervised by persons qualified to level 2 or 3 who are responsible for the evaluation of the results.

UT = Ultrasonic Testing (for carbon steel 15mm wall thickness or greater):

Ultrasonic testing is preferred on carbon steel where the material thickness is greater than 15 mm.
Class III welds: carried out in accordance with EN 1714:1998 Class B.
Class I or II welds: carried out in accordance with EN 1714:1998 Class A.
The acceptance criteria are defined in EN 1712:1997 acceptance level 2.
Testing should be carried out by persons qualified to at least EN 473:2000 Level 1, supervised by persons qualified to level 2 or 3 who are responsible for the evaluation of the results.

MT = Magnetic Particle Testing:

The examination shall be carried out in accordance with EN 571-1.
The acceptance criteria are defined in EN 1298:1998 acceptance level 1.
Testing should be carried out by persons qualified to at least EN 473:2000 Level 1, supervised by persons qualified to level 2 or 3 who are responsible for the evaluation of the results.

If a weld is rejected, two more welds of the same type by the same welder must be examined. If these are acceptable then the initial weld can be repaired and re-examined. If either of the additional welds examined is unacceptable then all of the welds in the group must be examined and repaired and re-examined as required.

All welds should be visually examined externally and internally for defects and irregularities.

STANDARD
Pipework Standard 002

Suitable pipework contents:

Pipework contents	Notes
Pumped Condensate	Pipework from condensate return vessel pump outlet.

Relevant Standards:

Pipework: ASME B31.3 – 2002 – Process Piping
Pressure Equipment Directive 97/23/EC
Testing: BS EN13480 – Metallic Industrial Piping
Welding: Welders used for manufacturing or installation must have completed and passed a test in accordance with BS EN 287.

Pipework, valves and fittings:

Item	Size range	Description	Notes
Pipe	1" – ¾"" DN15 – DN20	Stainless Steel, ASTM A312 TP316L Seamless Sch 40S, plain ends	
	1" - 12" DN50 – DN300	Stainless steel, ASTM A312 TP316L seamless Sch 10S, plan ends. For 4" and larger longitudinally welded at site engineers discretion.	Welded pipe and fittings shall be 100% radiographed by the manufacturer
	½" – 2" DN15 – DN50	Stainless steel, ASTM A312 TP 316L seamless, for straight pipe nipples Sche 40S, threaded ends BSP taper.	If a screwed connection is to be made to process equipment, use a schedule 40S nipple and break flanges to specification required. Not to be used for hygienic applications. Not to be used for sterile fluid applications. Use PTFE tape to BS 7786 for pipe thread sealing.
Fittings	½" – 12" DN15 – DN300	Butt weld, wrought stainless steel ASTM A403 WP316L seamless. Dimensions to ASME B16.9. Wall thickness to match pipe.	Use pulled bends (Rad 5D) for 1" NB and below. Where dimensions are limited, butt weld elbow may be used for ¾" NB and above.
	¼" – 1"	Threaded half coupling. Forged stainless steel ASTM A182 F316L. Dimensions to ASME B16.11 class 300#. Threaded BSP taper.	For instrumentation only. Not to be used for sterile fluid applications. Use PTFE tape to BS 7786 for pipe thread sealing.
Flanges	½" – 12" DN15 – DN300	Slip on, ASME B16.5 class 150# RF. Stainless steel ASTM A182 F316L.	Other flange standards e.g. BS10, PN16 etc. Installed only where required by mating equipment and when agreed with site engineer. Not to be used for hygienic applications. Shall be double welded.
Gaskets	½" – 24" DN15 – DN600	Class 150#, inside bolt circle (ring type). Graphite laminated with tanged stainless steel sheet reinforcement, flat ring type inside bolt circle, 1.5mm thick, dimensions to ASME B16.21	For use with weld slip on flanges.
Bolting	½" – 12" DN15 – DN300	Stainless steel heavy hexagon head machine bolt. Threaded full length with one heavy series threaded nut. ISO metric coarse thread. ASTM A193 GR B8 class 2 bolt with ASTM A194 GR 8 nut.	Washer of compatible material to be placed under nut.
Ball valves	½" – 1 ½" DN15 – DN40	3-piece, antistatic Stainless Steel body & end connectors. 316L Stainless Steel ball. TFM self-relieving seats (not on 3-way valves). & seals, graphite gland packing. Butt weld ends to suit pipe.	
	2" – 8" DN50 – DN200	150# flanged ball valve. 1-piece body. Firesafe & antistatic. 316SS body ASTM A351 CF8M. 316L stainless steel ball & trim. TFM self-relieving seats (not on 3-way valves) & seals, graphite gland packing. Flanged ends to ASME B16.5 150# RF.	
Needle valve	½" DN15	Needle valve for isolation, calibrating and venting with stainless steel 316 S16 body, spindle and handwheel. Hard seat. PTFE seal valve. BSP taper female ends.	For instrument isolation, calibration and venting only. Use PTFE tape to BS7786 for pipe thread sealing.
Check swing	½" – 12" DN15 – DN300	150# Swing type check valve. Bolted cover. 316 SS body, disc and cover ASTM A351 CF8M 316 SS trim. flanged ends to ANSI B16.5 RF.	

Branch table:

		HEADER															
BRANCH	**NPS**	**24**	**20**	**18**	**16**	**14**	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1 ½**	**1**	**¾**	**½**
	½	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT	BWT	BWT
	¾	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT	BWT	
	1	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT		
	1 ½	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT			
	2	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT				
	3	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT					
	4	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT						
	6	SOB	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT							
	8	SOB	SOB	SOB	SOB	SOB	SOB	SOB	BWT								
	10	SOB	SOB	SOB	SOB	SOB	SOB	BWT									
	12	SOB	SOB	SOB	SOB	SOB	BWT										
	14	SOB	SOB	SOB	SOB	BWT											
	16	SOB	SOB	SOB	BWT												
	18	SOB	SOB	BWT													
	20	SOB	BWT														
	24	BWT															

NPS: Nominal Pipe Size in Inches.
SOB: Set On Branch.
BWT: Butt Welding Tee.

Thermal insulation:

	Pipe size (NB)											Flat surfaces & vessels
	½"	¾"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	
	Thickness (mm)											
0 to + 185 C Rockwool	40	40	50	60	60	70	70	80	90	90	100	60
Aluminum cladding	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.6
Stainless steel cladding	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.5

A minimum clearance of 25 mm must be left all around a completed insulated pipe.

All insulated pipework must be supported on insulated blocks the same size as the required insulation thickness. Supports or brackets must be no closer than 30mm to the outside edge of the insulating block.

Supporting Spans:

The maximum pipe span in meters for 10s stainless steel pipe should be as follows:

Pipe size (NB)	½"	1"	1 ½"	2"	3"	4"	6"
Max pipe span (m)	1.5	2	2.3	2,7	3.4	3.8	4.4

Note: The preferred span for schedule 10s pipework, 25 NB and above, on gantries and intermediate supports is 2.5 meters.

Supports should be designed to allow adequate movement for thermal expansion of pipework.

Hydrostatic Testing:

All pipework subject to operating pressures in excess of 0.5 barg should be hydrostatically tested to 1.5 times the design pressure of the system unless it is impractical or undesirable for process/safety reasons to do so.

The design pressure of the system is the maximum possible pressure due to a protective device (e.g. relief valve set pressure) or the maximum service pressure x 1.1 (whichever is lower).

For modifications and repairs to existing pipework that has already been proven to be adequately strong either by previous testing or by an appropriate period of satisfactory service, either:

- The whole installed system should be hydraulically tested in situ.
  Or
- The modified section should be strength tested in the workshop and then assembled. Further strength testing is not required if the connections are flanged. If the final connections are welded then the system should be hydraulically tested in situ. This may be waivered on the written permission of the Site Engineering Operations Manager following at least a visual inspection and proof of NDT certification.

Before testing begins, all components in the system must be checked to ensure they can withstand the test pressure (isolating or removing as appropriate if acceptable to do so).

Certification of strength testing should be provided by the supplier.

Testing should not be performed below 7 °C ambient temperature.

Water is the preferred testing medium, if not practical then another fluid can be used.

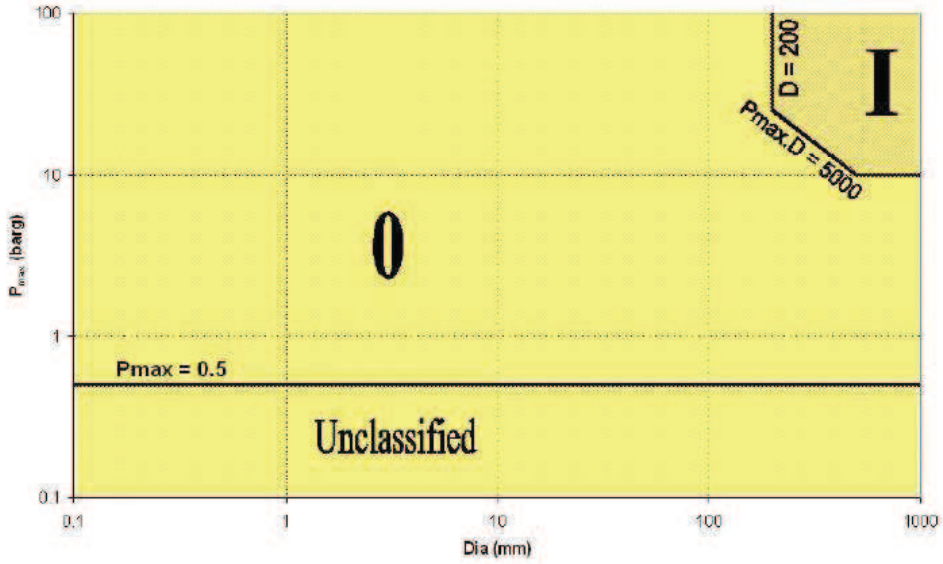
The test pressure should be raised incrementally in steps of not more than 10% of final test pressure or 1 barg (whichever is the lower increment) and the system checked for pressure loss over a specified period of no less than 5 mins at each increment. When the final test pressure is reached it should be held for at least 30 minutes. Testing should be witnessed by PIR or the PIR representative and their signature should be included on the test certificate.

Nondestructive testing:

The standard for testing of completed metallic pipework sections is BS EN 13480 and aligns with the Pressure Equipment Directive in terms of categories and definitions.

Atmospheric Condensate is considered a group 2 liquid.

The classification for this pipework can be found from the following table:



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