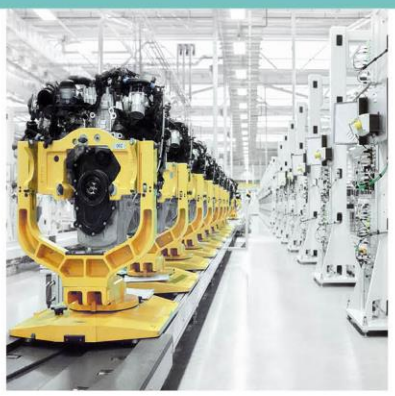
NG BAILEY

PROJECT NUMBER & NAME

MECHANICAL
COMMISSIONING SPECIFICATION

Revision No:

Date



NG Bailey

MAKING BUILDINGS WORK

DOCUMENT PREPARED BY

The details of the person(s) who have completed this mechanical commissioning specification.

Date	(TO BE COMPLETED MANDATORY)
Company / Role	(TO BE COMPLETED MANDATORY)
Name	(TO BE COMPLETED MANDATORY)
Signature	(TO BE COMPLETED MANDATORY)

CONTENTS

1. INTRODUCTION

The purpose of this document is to define the scope of works and provide a particular and definitive commissioning specification for projects where NG Bailey has sole design responsibility, or where there is no overarching employers' requirements document.

The commissioning specification forms part of the NG Bailey commissioning plan which is a requirement of Part L2A of the Building Regulations in England.

2. DESCRIPTION OF MECHANICAL SERVICES

This section should be completed by the mechanical designer

It is important that the designer explains how the mechanical and associated electrical systems are intended to operate in use to enable the BMS technical manager to produce a BMS description of operations and for the commissioning manager to understand the intended modes of operation and the applicable commissioning requirements.

Items to include but not limited to are:

- A system by system 'design intent' description of operation
- Individual system control strategy
- Integrated system control strategy
- Diversity applied to systems
- Differing modes of operation
- Principles of any unusual or innovative systems
- The scope of the commissioning works.

These notes to be deleted on completion of the description of mechanical services

3. DESIGN DATA

The following parameters have been agreed with the client in order to meet the required environmental conditions within the building and the project specification.

This section should be completed at design stage by the NG Bailey Mechanical Designer

Design Criteria	Room/Area	Requirement
External design conditions:		summer xx °Cdb summer xx °Cwb winter xx °Cdb winter xx °Cwb
Internal design conditions:	Room type 1: Room type 2: Room type 3:	summer xx°C +/- xx°C summer xx %RH +/- xx %RH winter xx °C +/- xx °C winter xx %RH +/- xx %RH
Internal Noise levels:	Room type 1 Room type 2 Room type 3	NR NR NR
Occupancy levels: (No. persons/m2)	Room type 1 Room type 2 Room type 3	

Fresh air ventilation rate for occupants: (l/s/person)	Room type 1 Room type 2 Room type 3	
Supply air temperatures:	Room type 1 Room type 2 Room type 3	
Maximum CO2 levels: (where applicable)	Room type 1 Room type 2 Room type 3	
Air change rates: (ach)	Room type 1 Room type 2 Room type 3	
LTHW Heating system	Flow temperature (°C) Return temperature (°C) Max operating pressure (Bar)	
Chilled water system	Flow temperature (°C) Return temperature (°C) Max operating pressure (Bar)	
Domestic hot water system	Max temperature (°C) Max operating pressure (Bar)	
Internal Lighting	Room type 1 Room type 2 Room type 3	Lux Lux Lux
Air Permeability	Building envelope	m3 / (m2.hr) @ 50 pascals

4. FACTORY ACCEPTANCE TESTS (FAT)

This section should be completed at design stage by the NG Bailey Mechanical Designer

Refer to the project specification and/or NG Bailey guidance on the requirements for FAT's and list as applicable

The following items of plant / equipment have been specified for factory acceptance testing:-

5. SITE ACCEPTANCE TESTS

This section should be completed at design stage by the NG Bailey Mechanical Designer

5.1. PIPEWORK INSTALLATION PRESSURE TESTING

Element	Working Pressure (Bar)	Test Pressure(Bar)	Hydraulic / Pneumatic
LTHW			
Chilled water			
Condenser water			
Domestic cold water			

Domestic hot water			
External mains water			
Add / Delete as applicable			

5.2. VENTILATION SYSTEMS AIR LEAKAGE TESTING

This section should be completed at design stage by the NG Bailey Mechanical Designer

Vent System Type	Ductwork Leakage Classification (Class A / B / C)	Testing Required (Yes / No)	Testing % Required
General Ventilation			
Local Exhaust Ventilation			
Air Handling Units			
Add / Delete as applicable			
Add / Delete as applicable			

5.3. SOIL & VENT PIPEWORK LEAK TESTING

This section should be completed at design stage by the NG Bailey Mechanical Designer

Element	Hydraulic / Pneumatic	Test Criteria	Testing % Required
Soil & Vent Stack Pipework (Risers)			
Soil & Vent Pipework			
Floats (Run-outs)			
Condensate from HVAC Plant			
Add / Delete as applicable			

5.4. NATURAL GAS TESTING/COMMISSIONING

This section should be completed at design stage by the NG Bailey Mechanical Designer

Element	Test Type	Testing Criteria	Testing % Required
Natural Gas Pipework			
Gas Proving System			

Gas Booster			
Add / Delete as applicable			

5.5. SPECIALIST SYSTEMS

This section should be completed at design stage by the NG Bailey Mechanical Designer

Element	Working Pressure (Bar)	Test Pressure (Bar)	Hydraulic / Pneumatic
Medical Gases ???			
Refrigeration System ???			
Fire Protection Systems ????			
Add / Delete as applicable			

5.6. ACOUSTIC TESTING REQUIREMENTS (ADD OR DELETE SECTION AS APPLICABLE)

This section should be completed at design stage by the NG Bailey Mechanical Designer and should include:

Confirm acoustic testing responsibility & authority

List any special acoustic requirements such as:-

- External / boundary noise requirements
- Any special internal noise requirements
- Acoustic testing criteria

6. PHASED COMMISSIONING REQUIREMENTS (DELETE IF NOT APPLICABLE)

This section should be completed at design stage by the NG Bailey Mechanical, Electrical Designers, BMS Technical Manager & Commissioning Manager (As required).

To ensure the successful commissioning of the building engineering services on projects with phased handovers it is essential to identify which systems are to be operationally ready for each completion date and where part of a larger incomplete system, how they are to be proven as a partial system ready for operation either independently or integrated with other systems.

7. BUILDING MANAGEMENT SYSTEM

7.1. DESCRIPTION OF OPERATION

This section should be completed at design stage by the NG Bailey Mechanical Designer & BMS Technical Manager.

7.2. BMS WITNESSING CRITERIA

This section should be completed at design stage by the NG Bailey BMS Technical Manager.

For BMS witnessing criteria refer to section 6.0 of the NG Bailey Building Management Systems General Specification.

8. PRE-COMMISSION CLEANING (PCC) OF PIPEWORK SYSTEMS

Pre-commission cleaning (PCC) shall be undertaken to eliminate system contaminants such as mill scale, building debris and jointing compounds that will inevitably be found in newly-fabricated pipework systems.

It shall be achieved through a process of flushing and chemical cleaning (where required), followed by the addition of biocides, corrosion inhibitors and specified requirements such as glycol.

PCC activities shall be carried out by suitably trained and experienced operatives working within a managed framework that will ensure safe and effective working practices, with appropriate record keeping and verification at each stage of the PCC process.

PCC shall be carried out in accordance with BSRIA BG 29 and other associated industry guidance / approved codes of practice.

A detailed method statement covering the PCC process shall be provided by the appointed PCC specialist prior to the commencement of the PCC process.

8.1. GENERAL SYSTEM CONSTRUCTION/INSTALLATION INFORMATION

This section should be completed at design stage by the NG Bailey Mechanical Designer.

8.1.1. LTHW HEATING SYSTEMS

System Volume XX, XXX (Litres)			
System Item	Item Material(S)	Pipework Installation Method	Approximate % Of System Material Content
Pipework			
Heat Source 1			
Heat Source 1			
Heat Emitter Type 1			
Heat Emitter Type 2			
Heat Emitter Type 3			
Heat Emitter Type 4			
Add / Delete as applicable			

8.1.2. CHILLED WATER SYSTEMS

System Volume XX, XXX (Litres) / Glycol Content XX %			
System Item	Item Material(S)	Pipework Installation Method	Approximate % Of System Material Content
Pipework			
Heat Source 1			
Heat Source 1			

Heat Emitter Type 1			
Heat Emitter Type 2			
Heat Emitter Type 3			
Heat Emitter Type 4			
Add / Delete as applicable			

8.2. PRE-COMMISSION CLEANING METHODS

Unless the project specification, employer's requirements or the designer's preference dictates a specific method for PCC i.e. traditional or a closed-loop pre-treatment cleaning (CPC), previously referred to as a minimal discharge / low effluent cleaning method then the following note maybe left for the appointed PCC specialist to advise in their preferred method. Delete this note.

On review of the project specification, information provided above, project programme and any environmental impact the appointed PCC specialist shall advise on which of the following 2 methodologies is most appropriate for the pipework system installation(s). Delete option as applicable.

8.2.1. TRADITIONAL METHOD

Delete option as applicable.

The appointed pre-commission cleaning specialist shall advise on the stages of pre-commission cleaning required to ensure that the treated systems comply with BSRIA BG 29, these stages may include / but not limited to the following:

- Static flushing
- Dynamic flushing
- Degreasing
- Biocide wash
- Removal of surface oxides
- Effluent disposal / final flushing
- Neutralisation
- Passivation
- Corrosion inhibitor and biocide dosing

To reduce the risk of introducing any contaminants into the systems from the local water supply, water samples will be analysed before any water is introduced into the systems for testing or water treatment, as per BSRIA BG 29 Table 6: fill water quality requirements.

All system water quality monitoring and sampling will be undertaken in accordance with the recommendation detailed in BSRIA BG 29.

8.2.2. CLOSED-LOOP PRE-TREATMENT CLEANING (CPC)

Delete option as applicable.

This is a method for cleaning pipework installations by filling with chemically dosed pre-treated water and dynamically circulating the water through deep bed filter media housings to remove contaminants and provide corrosion and microbiological protection to pipework installations. The fill water may also be pre-treated with non-chemical methods such as ultra-violet or other bacteriological removal equipment. CPC is undertaken without the need for a chemical cleaning procedure of the type described in section 8.2.1 above.

The appointed PCC specialist shall be consulted to establish the optimum minimal CPC methodology for the project.

To reduce the risk of introducing any contaminants into the systems from the local water supply, water samples will be analysed before any water is introduced into the systems for testing or water treatment, as per BSRIA BG 29 Table 6: fill water quality requirements.

All system water quality monitoring and sampling will be undertaken in accordance with the recommendation detailed in BSRIA BG 29.

9. TEST & COMMISSIONING CRITERIA

This section should be completed at design stage by the NG Bailey Mechanical Designer – add / delete / edit as applicable

General Installation Information			
Element	System Component	Test	Test Criteria
Ventilation	Ductwork cleaning	Verification of Cleanliness	Preferred vacuum test (PVT) results and report – TR19
	General ventilation systems	System balance / commission	CIBSE Code A
	Fire damper drop testing	Test & statutory demo	Building Regs Approved Document B BS 9999, DW144, DW145 NG Bailey – Inspection & Test Sheet Fire & Smoke Dampers
	Smoke damper testing	Test & statutory demo	Building Regs Approved Document B BS 9999, DW144, DW145 NG Bailey – Inspection & Test Sheet Fire & Smoke Dampers
	Add / Delete as applicable		
LTHW	Pressurisation unit	Commission & Demo	NG Bailey - Pressurisation unit design and commissioning procedure
	Heat source	Commission & Demo	Add as applicable
	LTHW System	System balance / commission	CIBSE Code W
	Add / Delete as applicable		
CHW	Pressurisation unit	Operational test and commission	NG Bailey Pressurisation unit design and commissioning procedure
	Cooling source	Commission & Demo	Add as applicable
	CHW System	System balance / commission	CIBSE Code W
	Add / Delete as applicable		
DH&CWS	RPZ Valve install & commission	Test & commission	WRAS Guidance Note 9 - 03-02 WRAS AIM 08-01
	Booster set	Operational test and commission	NG Bailey Cold Water Booster Set design and commissioning procedure

General Installation Information			
Element	System Component	Test	Test Criteria
	Heat source	Commission & Demo	
	Domestic Water Services	System balance / commission. Set system PRVs if present, test outlet temperatures, prove simultaneous demand.	CIBSE Code W Building Regulations Approved Document G BSRIA BG33 / 2014
	Domestic Water Services	Disinfection	Disinfection in accordance with BS8558 / BS6700 / PD855468
	Add / Delete as applicable		
BMS / Controls	Control Panel /MCC	Pre-commission and commission	CIBSE Code C
	Meter Interfacing- (Electric, Gas, Water, Rainwater, HWS etc.)	Test and verification	CIBSE Code C
	Add / Delete as applicable		
BMS / Controls	Add / Delete as applicable		
	Add additional systems as applicable		

10.SEASONAL COMMISSIONING

This section should be completed at design stage by the NG Bailey Mechanical Designer, add / delete / edit as necessary.

Seasonal commissioning shall be undertaken in accordance with the design specification and/or current BREEAM criteria, to ensure that the installed building services are operating efficiently, effectively and in accordance with the design specification following practical completion.

Seasonal commissioning visits shall include the following:

- Seasonal commissioning post occupancy customer feedback
- Customer meeting
- Investigation of customer concerns
- Review of BMS set-points, trend logs and alarm history
- Re-commissioning (where / if necessary)
- Issue of a seasonal commissioning report for each visit

There will be 3 / 4 seasonal commissioning visits per year over a period of 12 / 24 / 36 months.

11. APPENDICES

This section by should be reviewed the NG Bailey Mechanical Designer to ensure the tolerances below are applicable to the specific project.

11.1. COMMISSIONING TOLERANCES (AIR)

Flow regulation tolerances in air systems (CIBSE Commissioning Code A: 1996 (2006) Air distribution systems):

Table A1 Cumulative tolerance limits for regulation of air flow.

Type of System	Performance Effect	Terminals	Branches	Total Airflow
Mechanical Ventilation Comfort Cooling	Low	+20% of lowest terminal	+10% of lowest branch	+10% -5%
Air Conditioning Pressurisation of Escape Routes	Medium	+15% of lowest terminal	+8% of lowest branch	+10% -0%
Close Control Air Conditioning	High	+10% of lowest terminal	+5% of lowest branch	+5% -0%

11.2. COMMISSIONING TOLERANCES (WATER - HEATING)

Flow regulation tolerances in heating systems (CIBSE Commissioning Code W: 2010 Water distribution systems):

Table WA1.1 Suggested tolerances for flow regulation in heating systems.

Component	Tolerance
Natural Convectors (e.g. Trench Heaters, Radiators, and Radiant Panels)	Return temperatures all within ± 3ºC
Forced convection (fan driven) heating coils where flow rate is < 0.015 l/s	Refer to section WA1.4.1
Forced convection (fan driven) heating coils where flow rate is ≥ 0.015 l/s and < 0.1 l/s: Heating water ΔT ≤ 11ºC Heating water ΔT > 11ºC	 ± 15% ± 10%
Forced convection (fan driven) heating coils where flow rate is ≥ 0.01 l/s: Heating water ΔT ≤ 11ºC Heating water ΔT > 11ºC	 ± 10% ± 7.5%
Branches: Heating water ΔT ≤ 11ºC Heating water ΔT > 11ºC	 ± 10% ± 7.5%
Mains (flow from pump)	0 to +10%

Note: For a proportional balance to be achieved, the upper and lower tolerance levels should not be exceeded. The lower, i.e., negative value is the minimum value that the least favored or index unit should achieve. Wherever possible, the remainder of the proportional balance should be achieved within the overall tolerance and should aggregate to a minimum of 100%.

11.3. COMMISSIONING TOLERANCES (WATER – CHILLED WATER)

Flow regulation tolerances in chilled water systems (CIBSE Commissioning Code W: 2010 Water distribution systems):

Table WA1.2 Suggested tolerances for flow regulation in chilled water systems.

Component	Tolerance
Cooling coils where flow rate is < 0.015 l/s	Refer to section WA1.3.1
Cooling coils where flow rate is ≥ 0.015 l/s and < 0.1 l/s	-5 to +10
Cooling coils where flow rate is > 0.01 l/s	0 to +10
Branches	0 to +10
Mains	0 to +10

Note: For a proportional balance to be achieved, the upper and lower tolerance levels should not be exceeded. The lower, i.e., negative value is the minimum value that the least favored or index unit should achieve. Wherever possible, the remainder of the proportional balance should be achieved within the overall tolerance and should aggregate to a minimum of 100%.

11.4. COMMISSIONING CODES AND GUIDES

The commissioning of the mechanical services will generally be in accordance with the recommendations of the industry standards which include but not limited to the following documentation, including any subsequent amendments:

- CIBSE Commissioning Code A: Air distribution systems
- CIBSE Commissioning Code B: Boilers
- CIBSE Commissioning Code C: Automatic Controls
- CIBSE Commissioning Code M: Commissioning Management
- CIBSE Commissioning Code R: Refrigeration
- CIBSE Commissioning Code W: Water Distribution Systems
- CIBSE KS9: Commissioning Variable Flow Pipework Systems
- BSRIA Building Application Guide BG 29: Pre-commission Cleaning of Pipework Systems
- BSRIA Building Application Guide BG 49: Commissioning Air Systems
- BSRIA Building Application Guide BG 2: Commissioning Water Systems
- BSRIA BG 50: Water Treatment for Closed Heating and Cooling Systems

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