



**The Specification for the Design of System
Extensions, Connections and Services to Below 7
bar Wales & West Systems**

SECURITY CLASSIFICATION – PUBLIC

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May 2025

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FOREWORD

This document was approved by WWU's BPDC monthly meeting on 11th June 2024 for use by managers, engineers, and supervisors throughout Wales & West Utilities' gas network.

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Compliance with this document does not confer immunity from prosecution for breach of statutory or other legal obligations.

DOCUMENT CONTROL

The table below details the amendments made to the document, identifying specific sections that have been changes and dates when changes were made.

KEY CHANGES

Section	Amendments
All	General update of document references, terminology and working practices within WWU.
1	Non-Typical Load analysis added to the scope of the procedure.
4.1	Amended to reflect current working practices in WWU and clarify requirements.
4.1.1 and 4.1.2	Amended to clarify use of standard pressures for Mains Connections
4.1.3 and 4.1.4	Added to clarify use of standard pressures for Service Connections
4.4	Expanded information for Non-Typical Loads
4.5	Added for 'Fast Track' Acceptance Applications, setting out when the process can be utilised.
4.6	Added for Increasing loads on existing ISEP connections, details when standard pressures/elevated pressures apply, and the processes involved in both.

Section	Amendments
Appendix A	Tables A.1, A.2, A.3 & A.4 Updated to reflect maximum pressures. Notes amended to clarify use.
Appendix C	
Table C.1 and Table C.2	Replaced with Additional Load Information form for Non-Typical Gas Demands.
Table C.3	Winter Night and Summer Day removed, only Winter Day and Summer Night used. Summer Night scales updated.
Table C.2 & C.3 Notes	Amended to clarify process.
Table C.7	MP and IP Pressure Levels amended to System Peak Level Operating Pressure
C.4.2 & C.4.2.1	Deleted as No longer applicable.
C.4.4.2	Amended to clarify process.
Table C.8	Table Updated.
C.4.4.4	Amended to clarify process.
C.4.4.6	Amended to clarify process and ramp rate formula removed.

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BRIEF HISTORY

First Published as T/SP/NP14/E	May 2006
Re-issued to correct minor errors	June 2007
Rebranded & updated for clarification	July 2007
Amended to include 40mm MDPE for new LP & MP services	January 2008
Amended to reflect use of standard pressures and revised requirements for Non-Typical Loads	May 2025

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MANDATORY AND NON-MANDATORY REQUIREMENTS

In this document:

Must: Indicates a mandatory requirement prescribed in law.

Shall: Prescribes a Wales & West Utilities requirement that it is intended will be complied with in full and without deviation.

Should: Prescribes a Wales & West Utilities requirement that it is intended will be complied with unless after prior consideration (documented under T/PM/GR/7 process) a deviation is considered to be acceptable.

DEFINITIONS

Term	Definition
Annual Quantity (AQ)	The AQ means the estimate of the quantity offtaken from the National Transmission System (NTS) in the period of 12 months, on a customer by customer basis, at Seasonal Normal.

Term	Definition
Connected System Exit Point (CSEP)	A CSEP is an offtake from Wales & West Utilities' Gas Distribution Network to a Network owned and operated by an Independent Gas Transporter (iGT). There is no meter at the exit point.
Design Minimum Pressure (DMP)	The minimum pressure that may occur at the end of any service pipe at the time of system design flow rate under extreme gas supply and maintenance conditions.
Independent Gas Transporter (IGT)	Develop, operate and maintain local Gas Transportation Networks, that is, companies which manage gas transmission which fall outside National Transmission Network. IGT Networks are directly connected to the Gas Distribution Network (GDN) via a Connected System Entry Point or indirectly to the GDN via another IGT.
Individual Site Exit Point (ISEP)	Individual connection point onto the WWU network to feed a CSEP. CSEPs may be made up of one ISEP or multiple ISEPs.
Supply Hourly Quantity (SHQ)	The maximum hourly offtake a supply point.
National Transmission System (NTS)	High pressure system consisting of terminals, compressor stations, pipeline system and offtakes. Transports gas from terminal, to & from storage facilities and to Networks. Operates at up to 75 bar.

ACRONYMS

Acronym	Full Form
AQ	Annual Quantity
CSEP	Connected System Exit Point
DMP	Design Minimum Pressure
ECV	Emergency Control Valve
HP	High Pressure

Acronym	Full Form
iGT	Independent Gas Transporter
IP	Intermediate Pressure
ISEP	Individual Site Exit Point
LP	Low Pressure
MP	Medium Pressure
PID	Peak Instantaneous Demand
SHQ	Supply Hourly Quantity
SoS	Security of Supply
UIP	Utility Infrastructure Provider
NTS	National Transmission System

Comments

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SECURITY CLASSIFICATION – PUBLIC

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MANAGEMENT PROCEDURE FOR THE SPECIFICATION FOR THE DESIGN OF SYSTEM EXTENSIONS, CONNECTIONS AND SERVICES TO BELOW 7 BAR WALES & WEST SYSTEMS

1. SCOPE

This specification is for use in:

- The design of all mains, services, and mains risers.
- The review of designs submitted by Third Parties for evaluation.
- The evaluation of new or increased loads where there are no new pipes to be installed.
- Analysis for Non-Typical Loads.

2. PURPOSE

The purpose of this specification is to provide a consistent and defensible approach to the sizing of services, connections, and the quotation of design pressures.

3. ASSUMPTIONS

This document defines how the physical design of any pipe, subject to a new or modified demand, which is to be connected to a Wales & West Utilities parent main, shall be undertaken.

The connection for all demands, including Condition 16 (C16) loads, are to be designed in accordance with this document.

Please note: Details provided for C16 loads are for information only. These cannot be accepted, and reinforcement will not be planned for these loads. Where an IGT wishes to proceed with the C16 load, prior to connection, a new application will be required. Post connection, an increase in load must be submitted.

Interruptible supply requests should be evaluated in accordance with T/PR/NP/3.

4. SPECIFICATION

This Specification consists of several Appendices. Explanatory notes are contained in all Appendices to guide the Responsible and Competent person; however, the purpose of this section is to provide an overview of when to use any Appendix for a specific activity.

4.1 Requirement for Network Analysis

All requests received for new loads or increased loads shall be assessed to determine if network analysis is required at the application stage. Refer to Appendix A Table A.1 and Table A.2.

If the request falls outside the scope of Table A.1 or Table A.2 it shall be referred for network analysis and cannot utilise the 'Fast Track' Acceptance Process.

Standard or guaranteed pressures have been developed, to avoid the need to undertake network analysis at the application stage. The scope of guaranteed capacity extends to all Low Pressure (LP) and Medium Pressure (MP) requests up to 1733KW/160scmh, except for non-typical loads and/or requests for elevated pressures.

Refer to Appendix A, Tables A.2 and A.3.

The Security of Supply (SoS) check shall be carried out to ensure that capacity is available to support the required load. Any shortfall in capacity should be met, at Wales & West Utilities' cost, before the load can be connected.

The process for undertaking post acceptance SoS checks and notifying the customer of any lead times for provision of capacity, shall be in accordance with connections and planning policies/procedures.

4.1.1 Minimum Parent Main Pressures for LP Networks

The values in Table A.2. represent the minimum pressures to be quoted and designed to, for extensions to the WWU LP Network and new Individual Site Exit Point (ISEP) connections to the LP Network.

4.1.2 Minimum Parent Main Pressures for MP Networks

The values in Table A.3. represent the minimum pressure, 400mbar, to be quoted and designed to, for extensions to the WWU MP Network and new ISEP connections to the MP Network.

4.1.3 Minimum Design Pressures for LP Services

New load requests and renominations of load, for a single meter point or two-meter points, when designed as a dual service, or Connected System Exit Point (CSEP) request with an Annual Quantity (AQ) >2,196,000kW will be quoted and should be designed with a source pressure of 21mbar.

4.1.4 Minimum Design Pressure for MP Services

New load requests and renominations of load, for a single meter point or two-meter points, when designed as a dual service, or CSEP request with an AQ >2,196,000kW will be quoted and should be designed with a source pressure of 350 mbar.

4.2 Design of Services

Wherever possible services should be sized in accordance with standard tables.

Standard sizes do not preclude the reduction of nominal diameter for pipework and fittings at the service termination location. In these circumstances, it is not necessary to check the design in Toolbox.

All services shall be designed in accordance with Appendix B.

Pipe codes used in design tools shall be in accordance with Appendix D.

Additional or simplified requirements for specific areas of service design activities are outlined in the following sub sections.

4.2.1 New LP Services

Standard service sizes, for the range $\leq 1085\text{kW}$ and $\leq 63\text{m}$, shall be quoted in accordance with the values shown in Appendix A Table A.5.

Above ground domestic service laterals $\leq 15\text{m}$ shall be sized in accordance with Appendix A, Table A.6.

4.2.2 Increased Loads to Existing LP Services

Existing services, subject to a load increase, are permitted a maximum pressure drop of up to 5mbar where sufficient mains pressure is available.

The total revised load should be assessed against Table A.1 to determine any requirement for network analysis.

To assess whether a standard mains pressure can be utilised, reference shall be made to Appendix A, Table A.2, by comparing the total revised load (new plus existing) against mains size. If the total revised load request is $\leq 1083\text{kW}$ and the length $\leq 50\text{m}$ Appendix A Table A.8 should be used to determine if the existing service is to be replaced.

4.2.3 Replacement of services not subject to a load increase

Where an existing service is identified for replacement due to condition or policy, the process defined within the relevant management procedure should be used to identify the size of pipe to be installed.

4.2.4 New MP services

Standard service sizes, in the range $\leq 1085\text{kW}$ and $\leq 63\text{m}$, shall be sized in accordance with Table A.7.

4.3 Design of Mains

Mains shall be designed in accordance with Appendix B, and the pipe code table used in design tools shall be in accordance with Appendix D.

Additional or simplified requirements for specific areas of mains design activities are outlined in the following sub sections.

4.3.1 Standard LP/MP mains connection design sizes for Utility Infrastructure Provider (UIP)/Independent Gas Transporter (iGT) connections

Where the connected load is $\leq 10835\text{kW}$ the standard connection, corresponding to the load size, shall be found in Table A.4.

4.3.2 Approved mains connections for all pressure tiers and work types

Manifold connections shall not be used. Mains connections to an existing system should use a Wales & West Utilities Approved, manufacturer's standard tee or fitting.

The method for connection shall be in accordance with Tables A.9 and A.10.

4.4. Non-Typical Demands

A Non-Typical Demand is a demand with a non-typical seasonal and/or daily profile. A Typical Demand is one considered to be 'temperature sensitive', e.g., domestic customers, shops, offices. Any demand that does not follow a predictable, modulating pattern in line with domestic usage is considered non-typical.

Customers using compressors or boosters also fall into this category.

Requests where the demand is identified as being non-typical cannot utilise the 'Fast Track' Acceptance Process, even when the load falls within the guaranteed pressure tables.

It is important that sufficient information is gathered from the customer to properly assess the impact of non-typical demands on the upstream and downstream system network.

Network analysis, including the use of ramp rate analysis tools where necessary, shall be carried out. Reference should be made to Appendix C. The impact of non-typical demand profiles on linepack storage and/or the requirement for flexible offtake capacity should also be considered.

Further information can be found in 3rd Party Connections Briefing Note 6 – Non-Typical loads.

4.5 Criteria for Self-Acceptance ‘Fast Track’ Quotation Applications

New Load requests may bypass the formal quotation and acceptance process should meet the following criteria:

- New Typical Load Requests that fall within Table A.1.
- New Typical Load Requests that fall within the blue boundary section of Table A.2.
- New Typical Load Requests that fall outside of the remit of Tables A.1 and A.2 where an enquiry has been submitted and has identified no need for network reinforcement.
- Decrease in load CSEP Requests.

Please be aware that a significant number of projects that utilise the ‘Fast Track’ process require reinforcement solutions.

A number of ‘Fast Track’ Acceptances are being designated a Sufficiently Complex Job (SCJ) due to the works involved. This will affect the timescales involved in designing, planning and completion of the reinforcement, with lead times of approx. 12 - 24 months. Please see 3rd Party Connections Briefing Note 2 – Independent Gas Transporter (iGT) Process for advice.

Note – Reinforcement will not be planned before an approved planning application reference has been received.

4.6 Increasing Loads for Existing ISEP Connections

When requesting an increase in load on an existing ISEP connection, IGTs must provide the new total number of properties and loads (existing, plus additional). The Year 1 load should be the total load to be completed by the end of the current calendar Year (the Year the application is being submitted).

New and Existing Typical Loads connected to the LP network with loads that fall within Table A.2 may follow the ‘Fast Track’ Acceptance Process.

WWU will apply the pressure according to Table A.3 to ‘Fast Track’ Acceptance Applications and Quotation Requests for ISEPs connected to the MP Network.

New and Existing Typical Loads connected to the MP network with loads that fall within Table A.1 may follow the 'Fast Track' Acceptance Process.

Where an LP pressure above that shown in Table A.2 was previously accepted or an MP pressure above that shown in Table A.3, the IGT may request to maintain an elevated pressure. This should be the lowest pressure required to maintain the minimum pressure at the end of the IGT network.

WWU will consider the effect of providing an elevated pressure to the rest of the network and where possible, will provide the requested pressure. Should reinforcement be required to provide the requested pressure, WWU will design and cost the reinforcement required to reach the Table A.2/Table A.3 pressure, this will be produced in line with WWU's Reinforcement Policy Statement. The remaining reinforcement required to provide the elevated pressure will be designed and costed, with the IGT being liable for these costs.

Note – Reinforcement will not be planned before an approved planning application reference has been received.

Appendix A Standard Design Tables

A.1: Network Analysis Threshold Table for Low & Medium Pressure Systems

Table A.1 applies to single meter point or two-meter points, when designed as a dual service, to be supplied from LP and MP Networks and multiple premise sites from MP Systems. Using the diameter of the parent main, compare the Peak Instantaneous Demand (PID) with the requested hourly load - Supply Hourly Quantity (SHQ). Where the SHQ does not exceed the indicated value, no additional network analysis is required, and the design work should progress. The 'Fast Track' Acceptance Process may also be utilised.

Table A.1: Network Analysis Threshold Table for Low & Medium Pressure Systems

Nominal Pipe Diameter	Maximum demand (kW / scmh) [PID for single / dual services - LP] [PID for multiple premise sites – MP]	
	LP: DMP<19mb	MP: DMP>270mb
≤2" / ≤50mm metallic ≤ 63mm / ≤2" PE	≤66 / 6	≤220 / 20
>2" - ≤4" metallic	≤175 / 16	≤435 / 40
>50mm - ≤125mm metallic		
>63mm - ≤125mm PE		
>2" - ≤4" PE		
>4" - ≤6" metallic	≤450 / 40	≤925 / 85
>100mm - ≤150mm metallic		
>125mm - ≤180mm PE		
>4" - ≤6" PE		
>6" - ≤8" metallic	≤900 / 85	≤1410 / 130
>150mm - ≤200mm metallic		
>180mm - ≤250mm PE		
>6" - ≤8" PE		
>8" - 12" metallic	≤1733 / 160	≤1733 / 160
>200mm - ≤300mm metallic		
>200mm - ≤355mm PE		
>8" - ≤12" PE		
>12" / 300mm metallic	≤2170 / 200	≤2170 / 200
>355mm / 12" PE		

Table A.2: Connection Point Pressures for Low Pressure Systems

Minimum pressure to be supplied for a given level of demand and parent main diameter – the segment within the solid blue boundary line can be used to identify the supply pressure without reference to the network analysis model.

Table A.2: Connection Point Pressures for Low Pressure Systems

Max. Permissible Demand Nominal Diameter (kW/scmh)	≤175/ ≤16	≤450/ ≤40	≤900/ ≤85	≤1733/ ≤160	≤2170 /≤200	≤3240/ ≤300	≤4325/ ≤400	≤5410/ ≤500	≥5410/ ≥500
≤2" / ≤50mm metallic	23	23	23	23	25	26	26	26	26
≤63mm / ≤2" PE	23	23	23	23	25	26	26	26	26
>2" - ≤4" metallic	23	24	24	24	25	26	26	26	26
>50mm - ≤100mm metallic	23	24	24	24	25	26	26	26	26
>63mm - ≤125mm PE	23	24	24	24	25	26	26	26	26
>2" - ≤4" PE	23	24	24	24	25	26	26	26	26
>4" - ≤6" metallic	23	24	25	25	25	26	26	26	26
>100mm - ≤150mm metallic	23	24	25	25	25	26	26	26	26
>125mm - ≤180mm PE	23	24	25	25	25	26	26	26	26
>4" - ≤6" PE	23	24	25	25	25	26	26	26	26
>6" - ≤8" metallic	23	24	25	25	25	26	26	26	26
>150mm - ≤200mm metallic	23	24	25	25	25	26	26	26	26
>180mm - ≤250mm PE	23	24	25	25	25	26	26	26	26
>6" - ≤8" PE	23	24	25	25	25	26	26	26	26
>8" - ≤12" metallic	23	24	25	25	25	26	26	26	26
>200mm - ≤300mm metallic	23	24	25	25	25	26	26	26	26
>250mm - ≤355mm PE	23	24	25	25	25	26	26	26	26
>8" - ≤12" PE	23	24	25	25	25	26	26	26	26
>12" / >300mm metallic	23	24	25	25	25	26	26	26	26
>355mm / >12" PE	23	24	25	25	25	26	26	26	26

Loads that fall within the solid bold blue boundary are guaranteed capacity for all Typical Load types.

Loads falling within the shaded cells will be subject to a Post-Acceptance SoS check.

The values shown define the standard supply pressure for multiple premise sites.

The values outside of the defined box provide the minimum supply pressure and the charging point pressure for multiple premises sites where reference to the analysis model identifies the indicated pressure is not available.

In the case of alternative to reinforcement deep connection points the minimum pressure relates to the pressure at the customer's (downstream) end of the system extension.

The cell pressures can be used as available pressure for new service designs $\geq 180\text{mm}$ diameter, (see note 2 within Table B.1), and other service designs involving a mains element.

Non-typical loads that fall within the solid bold blue boundary in Table A.2 must be assessed using full Network Analysis and cannot follow the 'Fast Track' Acceptance Process.

However, the pressures are applicable for non-typical demand multiple meter point when used for Charging Point purposes only.

Requests for pressures higher than those quoted in Table A.2. cannot follow the 'Fast Track' Acceptance Process.

Note: Wales & West Utilities will identify the instances and the circumstances, normally at post acceptance, where Wales & West Utilities may choose to re-negotiate the pressure provided, to develop overall lower costs of reinforcement and connection.

Note: Summer operating pressures may vary.

Table A.3: Connection Point Design Pressure and Minimum Supply Pressure for all MP Mains Extensions

The values within this table represent the design pressure that should be used as the start pressure for the design of any connection onto the Wales & West Utilities MP Network.

Table A.3: Connection Point Design Pressure and Minimum Supply Pressure for all MP Mains Extensions

Pressure	Minimum Parent Mains Supply Pressure	Design Minimum Mains Pressure	Max Service Pressure Drop
MP = 270mb	400mb	350mb	70mb

The Minimum parent main pressures will be provided as the 'source' pressure for the design of the mains extension, new ISEP connections and increase in loads to existing ISEPs. However, they do NOT infer actual mains pressures to be maintained i.e., Wales & West Utilities may choose post-Acceptance to modify the pipe(s) to meet operational requirements of the system and will fund any subsequent changes.

UIP submissions must be designed in accordance with the pressures and pressure drops shown in Table A.3 and Table B.1. The pressures represent the minimum to be available during peak demand conditions. The pressure may be less than that indicated at off-peak times. The minimum pressure will be identified for inclusion within the quotations document.

The minimum parent main supply pressures will also be the minimum design pressures to be provided for mains extensions.

The cell pressures represent the minimum parent main design pressures to be provided for mains extensions, and/or used for charging point purposes for all load sizes, where reference to the analysis model identifies the indicated pressure is not available.

Charging point pressures for services are taken as the design minimum mains pressure.

Wales & West Utilities may choose to upsize mains to be laid, and/or take ownership, to provide enhanced mains extremity pressures (at Wales & West Utilities' cost) in accordance with the current agreement.

Requests for pressures higher than those quoted in Table A.3. cannot follow the 'Fast Track' Acceptance Process.

Table A.4: Standard Connection Diameter for Multiple Premises Sites (Final Connection for iGT/UIP Requests)

Wales & West Utilities will provide the default connection pipe diameter shown to supply multiple premises sites for the indicated maximum demand.

Table A.4: Standard Connection Diameter for Multiple Premises Sites (Final Connection for iGT/UIP Requests)

Max. Permissible Demand (kW/scmh)	LP: Diameter (mm)	MP: DMP>270mb Diameter (mm)
≤314 / ≤30	63	63
≤758 / ≤70	90	63
≤1100 / ≤100	90	63
≤1625 / ≤150	125	63
≤2167 / ≤200	125	63
≤3250 / ≤300	125	63
≤4333 / ≤400	180	63
≤5416 / ≤500	180	63
≤10835 / 1000	180	90
>10835 / >1000	By Negotiation	

The table values are the diameters to be used for quotation unless requested otherwise (note the value shown is the nominal diameter and may be subject to substitution with a material of similar effective diameter). Diameters greater than the value shown may be provided subject to additional cost.

The table values are the minimum values that will be accepted as a UIP design.

See Table A.9 & A.10 for list of approved connection types.

Table A.5: Standard Service Designs for LP Networks

Allowable Length PID	≤10m	≤15m	≤23m	≤30m	≤50m	≤63m
≤32.5kW	32mm	32mm	32mm	32mm	32mm	32mm
≤65kW (U6)	32mm	32mm	32mm	32mm	40mm	40mm
≤175kW (U16)	40mm	63mm	63mm	63mm	63mm	63mm
≤275kW (U25)	63mm	63mm	63mm	63mm	63mm	63mm
≤435kW (U40)	63mm	63mm	63mm	63mm	90mm	90mm
≤695kW (U65)	90mm	90mm	90mm	90mm	90mm	90mm
≤1085kW (U100)	90mm	90mm	90mm	90mm	125mm	125mm

Note: The values indicated can be replaced by the equivalent nominal diameter for an alternative material.

Note: An allowance has been made for the presence of standard connection & termination fittings.

To be used for service connection to LP mains only, using a standard manufacturer's connection (Table A.9 & Table A.10).

The lengths indicated represent the allowable plan length from parent (riser) main to meter point. Laterals more than the lengths indicated should only be installed with the Approval of the Responsible Person.

New UIP requests outside the remit of Table A.5. should utilise bespoke design tools that conform to other parameters from Appendix B.

Table A.6: Above Ground Standard Service Laterals to Domestic Premises (LP only)

Length PID	≤7m	≤15m
≤32.5kW	¾" St	¾" St
≤65kW (U6)	¾" St	1" St

To be used when designing above ground service laterals and laterals to be connected to an above ground riser.

Service laterals with a nominated demand more than 66kW should be designed in accordance with the process defined within Appendix B, taking account of the individual fittings to be used.

The lengths indicated represent the allowable plan length from parent (riser) main to meter point. Laterals more than the lengths indicated should only be installed with the Approval of the Responsible Person.

Table A.7: Default service design for all MP systems

Length (m) PID (kW / scm)	≤7m
≤ 175 / ≤16	32mm
≤ 695 / ≤65	40mm
≤ 1085 / 100	63mm

Services more than 63m in length should be designed in accordance with the process defined within Appendix B.

Service excess flow valves should be fitted on all MP domestic services where the PID ≤6scmh (66kW). Whilst there is no requirement for an additional service isolation valve, all other MP services should be provided with service isolation valves.

Table A.8: Maximum Length of Pipe to be Retained where a Large Pressure Drop (>2mb) is Available to be Used.

Max. Pressure Drop	≤3mb			≤4mb			≤5mb		
Length (m) PID	≤10	≤25	≤50	≤10	≤25	≤50	≤10	≤25	≤50
≤32.5kW	20mm	25mm	25mm	20mm	25mm	25mm	20mm	25mm	25mm
≤65kW (U16)	25mm	25mm	25mm	25mm	25mm	25mm	25mm	25mm	25mm
≤173kW (U16)	32mm	63mm	63mm	32mm	63mm	63mm	32mm	63mm	63mm
≤433kW (U40)	63mm	63mm	63mm	63mm	63mm	63mm	63mm	63mm	63mm
≤695kW (U65)	63mm	90mm	90mm	63mm	63mm	90mm	63mm	63mm	90mm
≤1085kW (U100)	63mm	90mm	90mm	63mm	90mm	90mm	63mm	90mm	90mm

Note: The values indicated can be replaced by the equivalent nominal diameter, e.g., 63mm PE is equivalent to 2" metallic.

This Table should be used to evaluate the design or retention of LP services in conjunction with Table A.2 to avoid the need for Network Analysis to evaluate new demands where:

- It is proposed to retain an existing service pipe subject to an increased demand.
- It is proposed to install a new service pipe with a pressure drop $>2\text{mb}$ (where the original design results in a pipe of $\geq 6''$ NB).

The minimum service diameter for all new services (including replacement of existing services where insertion cannot be used) is 32mm, irrespective of the pressure drop used for its design. The use of a smaller pipe for new services is prohibited.

Where it is not possible to design to 40mm, the pipe should be upsized to 63mm.

A.9: Approved Connections for PE pipe to PE mains

Note: Where there is more than one way of installing an approved type of connection, the least cost method will form the basis of any quotation. Only standard manufacturer's proprietary fittings should be used to provide connection to a Wales & West Utilities system i.e., the use of multiple fittings to provide adequate capacity is prohibited. Where the diameter required is not listed, the connection should be upsized.

Some of these techniques are not applicable for PE100 pipe.

Table A.9: Approved Connections for PE pipe to PE mains

Parent Main Connection	63mm	90mm	125mm	180mm	250mm	315mm	>315mm
≤63mm	63mm top outlet 'service' tee – a high volume tee should be used to connect along the length of a pipe & a coupler need to connect to the end of a pipe for continuations						
≤90mm	63mm x 63mm Cut Out Tee & Reducers(s)	Cut Out Tee or Equal Branch Saddle	Branch Saddle Connection				
≤125mm		90mm x 90mm Cut Out Tee & Reducer(s)	Cut Out Tee or Equal Branch Saddle	Branch Saddle Connection			
≤180mm			125mm x 125mm Cut Out Tee & Reducer(s)	Cut Out Tee or Equal Branch Saddle	Branch Saddle Connection		
≤250mm				180mm x 180mm Cut Out Tee & Reducer(s)	Cut Out Tee or Equal Branch Saddle	Branch Saddle Connection	
≤315mm					250mm x 250mm Cut Out Tee & Reducer(s)	Cut Out Tee or Equal Branch Saddle	Cut Out Equal Tee
>315mm					315mm x 315mm Cut Out Tee & Reducer(s)	Cut Out Tee or Equal Branch Saddle	

Table A.10: Approved Connections for PE / Metallic Pipe to Metallic Mains

Parent Connection	2"	3"	4"	6"	8"	10"	>10"
≤63mm / ≤2"	Encirclement Tee/Drilling Saddle			63mm or 2" Metallic Top Tee			
≤90mm / ≤3"	2" x2" Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)					
≤125mm / ≤4"		Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)				
≤180mm / ≤6"			Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)			
≤250mm / ≤8"				Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)		
≤315mm / ≤10"					Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)	
>315mm / >10"						10"x10" Encirclement Tee & Reducer(s)	Encirclement Tee & Reducer(s)

When considering the provision of a connection for a pipe >16" nominal diameter, a risk assessment should be undertaken. Further information is available from Wales & West Utilities (Asset Management Team).

Note – This is not an exhaustive list, other connection types are available and will be considered where applicable.

Appendix B Specification for The Design of Pipes

General Requirements

Wherever practicable, the design of a new pipe should be carried out using the relevant 'Standard Design Tables' from Appendix A. This will avoid carrying out a bespoke design if the demand and the mains system support the use of a standard design.

This Appendix describes the rules to be used where this is not appropriate. The responsible person should ensure that all pipe design, or design evaluation, is carried out regarding the requirements of T/PL/NP/16, T/PL/NP/18, and Connections Policy.

Reference should be made to the T/SP/NP/10 to identify the instances where a supply pipe should be considered to comprise a main, a service pipe or a riser. Once identified, the sections below should be used to design the pipe in an appropriate manner.

The following rules assume that no reinforcement of the existing system is required for the Post- Acceptance Design. In cases where reinforcement is required reference should be made to WWU's Reinforcement Policy Statement.

General Design Considerations

A main is a below ground pipe, or exceptionally an exposed pipe (e.g., bridge crossing) laid as an extension of, or change to, the system that supplies, or has the capability to supply, more than two primary meter installations.

A service is a pipe from a main up to and including the outlet of the first Emergency Control Valve (ECV) to an individual meter installation. This definition may occasionally include a dual service, supplying up to two primary meter installations in one or two buildings, with no other potential connections.

A mains riser is any above ground horizontal or vertical arrangement of pipes that supplies more than two primary meter installations in an individual premises or building.

A service riser is any above ground horizontal or vertical arrangement of pipes that supplies up to two primary meter installations.

A lateral is a term in current use to describe an above ground pipe connecting a riser to a single primary meter installation.

Length - The length of the pipe should be identified using WWU's MAPS and ERP, or the customer's site plan.

Velocity - For all new services operating at pressures not exceeding 7 bar the design gas velocity shall not exceed 15m/s.

For all new mains operating at pressures not exceeding 7 bar the design gas velocity should not exceed 40 m/s.

Pipe Code Table - The pipe code tables given in Appendix D should be used for the design of all new system extensions to the Wales & West Utilities network. Under the direction of the Responsible Person, other pipe sizes and efficiencies will be used when incorporating existing, or non-standard, pipes within a new design.

Route Planning - the route should be planned in accordance with the recommendations and guidance given in IGEM/TD/3, IGEM/TD/4, IGEM/GL/1, and IGEM/GL/2.

Note: it is Wales & West Utilities policy to terminate services at meter positions in external meter boxes on the front face of a building or not more than 2m up the gable; or to internal meter positions within 2m of the point of entry.

Non-typical demands - Reference should be made to Appendix C for details of the design requirements for these demands. Further information can be found in 3rd Party Connections Briefing Note 6 – Non-Typical Loads.

Table B.1: Maximum Design Pressure Drop

Note: The following values should be used for the design of all services; and they must not be exceeded.

Description Pressure Tier	Description	Maximum Design Pressure Drop
LP (DMP ≤19mb)	New	2mb or ≤5mb ^{1 2}
	Non-Insertion Replacement	2mb or ≤5mb ^{1 2}
	Insertion Replacement	≤5mb ³
MP (DMP >105mb)	All	70mb
IP	All	20% of available pressure drop (capped minimum of 140mb)

¹ Where the new service contains pipe ≥180mm (nominal) diameter & reference to network analysis contains the pressure to be used.

² For loads that fall within the Scope of Table A.2, the assumed parent mains pressure will be taken from the appropriate cell.

³ Where the parent main has been confirmed as acceptable.

The design shall include an allowance for connection & termination fittings and must remain within the defined maximum pressure drop value.

B.1: Design of Mains

B.1.1 Pipe Fittings

The impact of minor fittings (connections, bends, valves etc.) should be managed within the design tool through a reduction in the hydraulic efficiency of the pipe system, so no allowance should be made in the design for any fittings associated with the mains connection. However, if the Responsible Person directs that a non-standard connection (less than the nominal diameter of the extension) be used, the fitting (in the form of an extension of the pipe equivalent to the length shown within Tables B2 & B3) should be added to the network model.

The minimum supply pressure (defined within Table A.2), for multiple premises sites, is the pressure to be supplied at the outlet of the Wales & West Utilities system i.e., at the outlet face of the valve or 'pup' fitting provided to allow connection to the main.

The pressure loss across this fitting should not exceed more than 10% of the available pressure for the design of the system extension.

B.1.2 Mains Extension Designs Arising from Request for Supply to Individual Premises

B.1.2.1 Pre-Acceptance Design

For a single premise design where a main is to be provided, the main should be designed using the pressure indicated within Table A.2 or A.3 as the source pressure.

If Table A.2 or A.3 cannot be used, reference should be made to Network Analysis to identify the allowable pressure drop.

Consideration should be given to designing the pipe as a single diameter and should not be less than 63mm PE in diameter (or equivalent for steel pipes).

B.1.2.2. Post-Acceptance Design

Upon receipt of an Acceptance, reference should be made to Network Analysis to identify the allowable pressure drop. The 'Industry least cost' solution should be identified and installed; the main should not be less than 63mm PE in diameter (or equivalent for steel pipes).

Where a C16 demand is required, the pressure to be supplied to the future connection point of this potential demand should be identified - this may be part way along, or at the end of the main. See Table A.2 or A.3 for the required pressure at that future connection point for LP and MP systems.

B.1.3 Design of Mains Extensions to Sites with Multiple Premises

B.1.3.1 Demands

Post-acceptance, the mains should be designed to supply the requested demand and any C16 potential demand identified by Wales & West Utilities, see Section B.1.2.2.

B.1.3.2 Connection Point Pressures

Where the level of demand does not exceed the value in Table A.2 or A.3 for the diameter of supply pipe, the indicated supply pressure should be used.

Where the requested demand exceeds these maximum values, the connection pressure on the parent main should be obtained through network analysis using the appropriate Forecast Year model (subject to the minimum value shown within Tables A.2 or A.3).

B.2 Services

B.2.1 Pipe Fittings

As indicated in the Assumptions, an allowance should be made in the design for all fittings used as part of the service installation. This should be done using the equivalent length of pipe associated with each fitting component, as shown within Table B.2 & B.3, for any pressure tier. The calculations should be carried out to ensure that pressure drop within the pipe does not exceed the maximum value shown in Table B.1.

B.2.2 Design New Service

B.2.2.1 Pressure

The service should be designed using the pressure drop shown in Table B.1 and minimum pressure associated with the relevant pressure tier.

B.2.2.2 Pipe Diameter and Fittings

The minimum diameter used for all new services is 32mm PE or equivalent. Figure B.1 details the rules when a composite pipe should be considered. Services up to 63m long should be designed as a single diameter.

B.2.2.3 Design of composite pipes for use in new services

Composite pipes should be designed using two diameters only, with the larger diameter as the connection pipe, and the smaller as the termination, considering the pressure losses arising from the equivalent lengths of fittings. Fittings should be designed to be the same size as the service pipe to which they are connected.



Figure B.1 Design single diameter or composite pipe

Length	Criteria	Service Configuration
$X_m \leq 63m$	n/a	Single Diameter
$X_m > 63m$	Where $Y \leq 30\% X$	Single Diameter Pipe
	Where $Y > 30\% X$	Composite Pipe

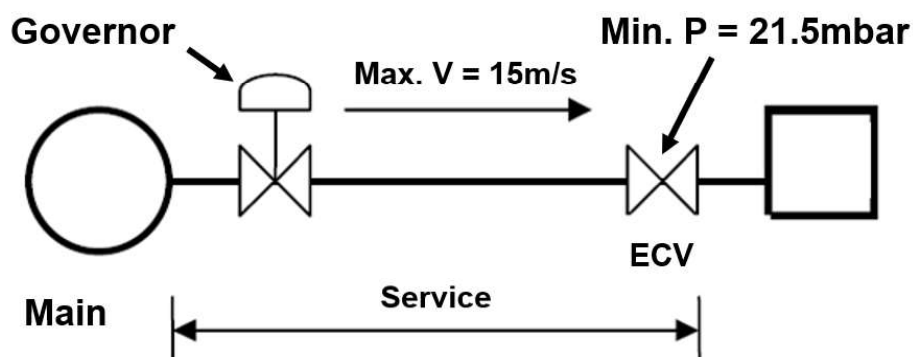
Service should not be designed as a composite service where the length of one part is very small (<30% of the total length). Consideration can still be given to reduce the termination down one size.

For example, on domestic installations, it is anticipated a $\frac{3}{4}$ " x 25mm house entry tee will normally be used; however, this change in size should not be considered to constitute a composite pipe.

The equivalent lengths for fittings are to be used within composite pipe calculations are defined within Appendix B, Tables B.2 & B.3.

B.2.2.3 Remote Pressure Reduction

Services from Medium Pressure (MP) and Intermediate Pressure (IP) mains may be designed with the pressure reduction unit remote from the meter unit.



Where this is the case, the full pressure drop between the outlet of the pressure reduction unit and the normal pressure required at the ECV should be used in the service design. In such installations, the pressure drop associated with the LP service may exceed the standard value shown within Table B.1, and the limiting design criterion may be the gas velocity.

Table B.2: Equivalent Lengths of Standard Service Components

Fitting Description	Pipe Diameter								
	≤32mm or ≤1" St	≤63mm or 2" St	≤90mm or ≤3" St	≤125mm or ≤4" St	≤180mm or ≤6" St	≤250mm or ≤8" St	≤315mm or ≤10" St	≤355mm or ≤12" St	>355mm or 12" St
Elbow	0.5m	1m	1.5m	2.5m	3.5m	5.0m	7.0m	10.5m	14.5m
Tee – flow straight through	0.5m	1m	1.5m	2.5m	3.5m	5.0m	7.0m	10.5m	14.5m
Tee – flow through branch	1.5m	3m	4.5m	7.5m	10.5m	14.5m	19.0m	25.0m	31.0m
Swept bend	0.3m	0.45m	n/a	n/a	n/a	n/a	n/a	n/a	n/a
All valves	0.45m	0.68m	1.0m	1.8m	2.7m	4.2m	6.0m	8.0m	10.5m
Meter box entries	0.5m								

Table B.3: Service Components – Specific Fittings

Description of Connection Fitting	Equivalent Length	Equivalent Diameter
32mm Tee of any PE Diameter	2.0m	32mm PE
63mm Tee of any PE Diameter	4.0m	63mm PE
11/2" Flex Top Tee	4.0m	11/2" Steel
1" Metallic Top Tee	4.0m	1" Steel
Reduced Branch Tee	Length of "Tee – flow through branch"	Use diameter of Branch pipe

B.2.3 Increase Demand in Existing Service

For the purposes of this document, an existing pipe should be assumed to exist where there is a live pipe identifiable in Wales & West Utilities' Engineering Asset Repository (SAP/WAM).

Where there is no record of an existing 'live' pipe, unless a site visit identifies otherwise, it should be assumed that any existing pipe is not suitable for use to transport gas. In such circumstances, a new pipe design should be undertaken.

B.2.3.1 Evaluation of the Configuration of an Existing Service

Where possible, the configuration (length and diameter) of the service should be identified from Network 'as laid' records.

In the absence of this information, it should be assumed that the service is constructed in one pipe diameter, with a standard connection and termination configuration.

B.2.3.2 Assessment of Existing Design

The connection and termination fittings should be considered when calculating the pressure drop associated with the total increased demand.

Where the identified pressure drop exceeds that given for the relevant pressure tier in Table B.1, the existing service should be replaced, with the service being designed to meet this defined pressure drop limit.

B.2.3.3 Velocity

Following an increase in demand, an existing service should not be replaced because of the maximum velocity being exceeded.

B.3 Riser Design and Premises with Banks of Meters

B.3.1 Pressure

The pressure at the extremity of a mains riser should be the same as the system minimum mains design pressure.

B.3.2 Design of riser and associated approach main

B.3.2.1 Designs connecting to LP mains

The approach main and above ground mains riser should be designed as a single unit and be based on the available pressure drop in the parent main or, where appropriate, the standard pressure taken from Table A.2.

B.3.2.2 Designs connecting to MP or IP mains

Approach mains should be designed as a single unit using the available pressure drop.

The available pressure drop should be the difference between the outlet of the pressure reduction unit and the minimum pressure at the extremity of the riser.

B.3.2.3 Fittings

No allowance should be made in the design of the mains riser or the approach main for the presence of fittings.

B.3.2.4 Lateral Design

Where the use of Table A.6 is not possible, for example the demand or length exceeds the values, individual laterals should be designed using the service calculator, with a maximum pressure drop of 2mbar. Laterals should be designed as single diameter pipes, with an allowance made for the presence of fittings.

B.3.3 Design of above ground rails (also known as above ground manifolds)

This Table should be used for the design of single column above ground risers, when used with standard design above ground service laterals. It should also be used for the design of manifolds i.e., blocks of flats with ground floor banks of meters.

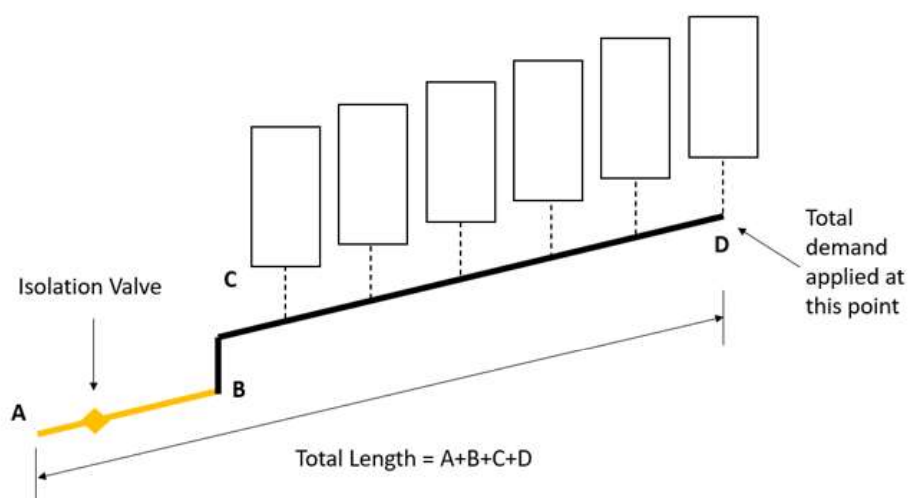
Table B.4: Standard Designs for Single Column Risers and Manifolds

Length Maximum Design Demand	≤ 15m	≤ 23m	≤ 30m	≤ 50m
≤65kWh	32mm / 1" St	32mm / 1" St	32mm / 1" St	63mm / 2" St
≤175kWh	63mm / 2" St	32mm / 1" St	32mm / 1" St	63mm / 2" St
≤275kWh	63mm / 2" St	63mm / 2" St	63mm / 2" St	63mm / 2" St
≤435kWh	63mm / 2" St	63mm / 2" St	63mm / 2" St	90mm / 2" St
≤695kWh	90mm / 2" St	63mm / 2" St	63mm / 2" St	90mm / 2" St
≤1085kWh	90mm / 2" St	90mm / 2" St	90mm / 2" St	N/A

- To be used to design single column above ground risers and multiple, above ground manifolds connected to LP mains.
- Assumed that the nominal mains connection fitting is not less than the downstream pipe.
- The lengths indicated represent the total length from parent main to end of 'main' the mix of below/above ground pipe work is not considered significant.
- Total diversified demand is assumed to be at end of 'main'.
- Supplies must be designed in accordance with IGEM/TD/4.

Following the publication of Safety & Engineering Instruction No: WWSEI130, Wales & West Utilities will no longer install or approve, PE riser installations on either Low or High-Rise multi-occupancy buildings (MOBs), 3 storeys or above on the WWU Network.

The use of suitable approved alternative systems such as welded/threaded steel or Mapress in line with WWU engineering procedures and industry guidance and will also require approval from Distribution Asset team.

Figure B.4: LP above ground rail, meters at separate locations – typical configuration

Service laterals should be designed in accordance with the requirements of Table A.6.

B.3.3.1 Bespoke Design

Where it is not possible to design the rail using this approach, it should be designed in accordance with Section B.3.2.1.

B.4 Design of Connections to a Wales & West Utilities Network Parent Main

Refer to Tables A.9 and A.10.

Where an iGT has stipulated a connection diameter less than that given in Table A.4, the iGT should be asked to confirm the requirement before a quotation is issued.

Where a UIP indicates a diameter less than the value within the Tables, the design should be evaluated to confirm they are suitable and should be rejected where appropriate. The Responsible Person should ensure that C16 demands are considered before confirming that connection should progress.

Appendix C Evaluation and Design of Connection of Non-Typical Demands

Where necessary, the relevant demand profile/gas use information should be provided under the Business Rules to allow the provision of a practical design solution. Where, at the outset of the design process this information is incomplete, a number of simplifying assumptions may be applied resulting in a sub-optimal design solution and additional assessment as the type and nature of the installation becomes clear.

The information that is required is shown in the Additional Load Information Form for Non-Typical Gas Demands form.

Where the customer has identified a non-typical demand, it should be assessed using network analysis and, where appropriate, approved ramp rate analysis tools. The analysis should consider the impact of the customer's ramp rates at worst-case demand conditions.

The following description is not intended to be specific to individual analysis tools but is instead intended to address the principles of assessing non-typical Loads.

C.1 Assessment of Individual Non-Typical Demands

Where a demand is to be used at a specified off-peak period only, its impact should be assessed, using the relevant model, against the specified period. The limited period identified will be clearly stated on all quotation's correspondence as a condition of supply.

For low pressure networks or other networks where source pressures are reduced at off-peak conditions, the impact of the demand should be assessed against the two standard conditions see Table C.3.

Table C.3: Conditions to be Modelled for Non-Typical Off-Peak Demands on LP Networks and Direct Fed MP demands.

Source Settings	Standard Conditions	Scale for Demand Types		
		Domestic	Commercial	Industrial
Winter Day	Peak Hour, Peak Day Pressure	100%	100%	100%
Summer Night	Minimum Hour, Minimum Day Pressure	3%	3%	20%

- The figures shown in this table shall be used to ensure consistent design output is provided. No additional demand modifications should be made to model demands being absent, or present, for the time the analysis being carried out.

- Any 'Commercial' demand should be assumed temperature sensitive and any 'Industrial' demand as being constant for Winter Day analysis, but away from peak industrial diversification and temperature sensitive industrials should be considered.
- For MP networks assume downstream demand is per the domestic tag. For the design of single and composite pipes and mains, see Appendix B.
- Where available, use of localised flow telemetry should be considered to gauge suitable demand scaling factors.

C.2 Supplies to elevated pressure demands

Contact should be made with any consumers requesting an elevated pressure to identify when this pressure is required.

WWU do not guarantee that elevated pressures will be approved, where they are, an agreement will need to be entered into with WWU's Commercial Department.

Where a specific period is specified, analysis should be undertaken to identify how it can be provided. Where the customer is not able to define a period the range of pressures associated with the point of connection should be identified using the settings shown in Table A.6.

C.3 Supplies to ISEPs Containing Non-Typical Demands

Where an ISEP includes a non-typical demand or a demand that has downstream compressor or booster or has requested specific off-peak pressures, the iGT will be requested to supply the relevant demand profile/gas use information under the Business Rules via the Additional Load Information Form for non-typical gas demands.

Requests for new connections or increase in loads to ISEPs containing a non-typical gas demand cannot utilise the 'Fast Track' Acceptance Process.

These demand levels should be applied to the relevant model(s) and the iGT provided with the resultant pressures at the ISEP connection.

The demands should be scaled for the two standard conditions in accordance with the scaling factors given in Table C.3.

Additionally, where an iGT has identified that the ISEP includes a supply to a compressor or booster, the two standard pressures should be quoted. The iGT will be requested, as part of the Quotation, to confirm the supply pressures are adequate, and the impact of the demand at the worst-case condition will not materially affect the parent system.

Where higher, peak, or off-peak, pressures are required by the iGT than are indicated as being available, reinforcement should be evaluated in accordance with the requirements of this document and quoted in accordance with WWU'S Connection Policy Manual.

The off-peak demand data should be retained for future modelling off-peak conditions and maintenance of the required pressures.

The connection to the iGT site should be designed in accordance with Appendix B, or as requested by the iGT.

C.4 Assessment of supplies using approved analysis tool

Appendix C, Table C.4 identifies the types of demand for which ramp rate analysis is required.

Table C.4: Demand Types for use with approved analysis tool

Demand Type	Ramp Rate Assessment Required
Non-typical consumption profile to individual demand	Yes
Non-typical consumption profile to CSEP	Yes
Downstream compression to individual demand	Yes
Downstream boosting to individual demand	Yes
Elevated pressure to individual demand	No
Downstream compression or boosting to CSEP	In agreement with iGT
Power Generation	Yes
Vehicle Fuelling	Yes

For connections to all pressure tiers below 7bar, when undertaking ramp rate analysis and assessing storage needs, network analysis of the appropriate Forecast Year models and the relevant conditions should be undertaken to derive the steady state pressures available in the network.

Appendix C, Table C.5 identifies the typical periods when the network is likely to experience maximum pressures under shut down conditions and minimum pressures under start up conditions. Reference to the table ensures that the level of demand which causes a rapid change, and the service design will not give rise to unacceptable pressures in the network at these times.

Note: This list is not comprehensive, and the Competent Person should ensure that the 'worst case' condition is understood, and account taken of it i.e., the condition may depend upon the network and the type of pressure management implemented.

Table C.5: Typical worst-case pressure conditions for ramp rate assessment

Assessment	Type of Network Pressure Management	Source Setting	Condition
Start-up	Fixed	Winter Day	Peak Hour, Peak Day Pressure
	Clock pressure	Winter Day	Peak Hour, Peak Day Pressure
	Computer managed (closed loop control or pressure profiling)	Variable	Min Hour, Min Day Pressure
Shut down	Fixed	Summer Night	Min Hour, Min Day Pressure
	Clock pressure	Winter Night	Min Hour, Peak Day Pressure
	Computer managed (closed loop control or pressure profiling)	Variable	Peak Hour, Peak Day Pressure

C.4.1 Demand factors for use in approved analysis tool

To evaluate the impact of the specific compressor, the appropriate factor, as shown in Table C.6, should be applied to the steady state flow when using approved analysis tool:

Table C.6: Factors for use in approved analysis tool

Type	Factor
Booster	0
Reciprocating compressor	2.3
All other compressor types	1.0

Applying this factor takes account of the different ways that the equipment operates and ensures that its impact is known.

C.4.3 Transient Pressure Constraints for the Assessment of Non-Typical Demands

The maximum permissible transient pressure constraints, shown in Table C.6, should not be exceeded when evaluating the impact of a non-typical demand. These values should be used within ramp rate analysis.

Table C.7: Transient Pressure for the Assessment of Non-Typical Demands

Constraint		Pressure Tier	Pressure Level	
Transient Pressure at Connection Point	Maximum Pressure	LP	75mbar	
		MP	System Peak Level Operating Pressure	
		IP	System Peak Level Operating Pressure	
	Minimum Pressure	LP	21mbar ⁴	21.5mbar ⁵
		MP	Minimum 6-minute mains design pressure ⁶	
		IP		
Transient Pressure at Meter Point	Maximum Pressure	LP	75mbar	
		MP	System Peak Level Operating Pressure	
		IP	System Peak Level Operating Pressure	
	Minimum Pressure	LP	19mbar ⁴	21.5mbar ⁵
		MP	Minimum 6-minute mains design pressure ⁶	

Please note: low pressure systems are not deemed appropriate for large 'on-off' demands, such as power generation or CNG Fuelling sites. Due to the narrow range of operating pressure and reduced 'linepack' within these systems there is a far greater risk of pressure breaches beyond the design limits when such sites ramp on or off. These will typically be required to connect to medium, intermediate or high pressure systems.

Industrial demands can pose a similar risk when commissioning or recommissioning after maintenance, but as this typically occurs less frequently WWU will decide on a site-by-site basis whether low pressure is suitable. Factors influencing this include size of peak load,

⁴ Systems designed pre-1997

⁵ Discrete Systems designed post-1996

⁶ Refer to Table B.1 – the minimum ECV pressure will be dictated by the allowable service pipe pressure drop

network operation (eg. fixed pressure or profiling), size of the network and proximity of the connection to governors.

C.4.4 Service design for supplies to demands requiring ramp rate assessment

The following rules should be applied to the design of the service.

C.4.4.1 Maximum Permissible Demand

The service should be designed using the PID identified by the customer and include the sum of any compressed demand plus all other demands.

C.4.4.2 Standard Pipe Diameters

The diameter of the service can only exceed the diameter of the main from which the connection is taken by one diameter step-change, as per Table C.8.

The table below represents the standard approved PE & steel design pipes. Pipes other than those shown are not approved for use and must not be employed for quotations purposes.

The equivalent nominal diameters in each row represent the maximum size of the parent main to which connection can be made, whilst meeting the requirements of this Instruction.

It has been assumed that only metric equivalent steel pipe will be used for service installation in the column showing the maximum permissible service diameter.

Table C.8 Standard pipe diameters - comparison table

To ensure that the relevant non-PE diameters are clearly understood, reference may be made to the following table.

Standard design pipe nominal diameters - default comparison.

PE (mm)	Metallic (Metric)	Metallic (Imperial)	Maximum Service Diameter (PE/Metallic)
16mm	-	-	-
20mm	-	½"	-
25mm	20mm	¾"	-
32mm	25mm	1"	-
63mm	50mm	2"	90mm / 80mm
90mm	80mm	3"	125mm / 114mm
125mm	144mm	4"	180mm / 168mm
180mm	168mm	6"	250mm / 219mm
250mm	219mm	8"	355mm / 324mm
315mm	273mm	10"	400mm / 406mm
355mm	324mm	12"	450mm / 425mm
400mm	406mm	15"	500mm / 457mm
450mm	425mm	16"	500mm / 457mm
500mm	440mm	17"	N/A / 610mm
-	457mm	18"	N/A / 610mm
-	508mm	20"	N/A / 610mm
-	610mm	24"	N/A / 610mm

C.4.4.3 Service Design Criteria

The initial service should be designed using the design criteria for the relevant pressure tier. The rules for the use of single and composite pipes should adhere to see Appendix A.

C.4.4.4 Assessment of Design

The resulting service layout should be input into the approved analysis tool, together with the appropriate mains. Where the assessment of this design results in system constraints being violated, the diameter(s) of the service should be increased, and the results reassessed.

Where modifying the service pipe diameter (bearing in mind the constraints on size of service) does not provide an acceptable solution, the provision of supply from a higher-pressure tier(s) should be considered. Where this is not possible, the customer should be advised that the supply couldn't be provided without modification of the ramp rate. Iterative analysis of the ramp rate will be needed to identify an acceptable rate.

C.4.4.5 Connection Fittings and Methods

Reference should be made to Tables A.9 & A.10 for the details of the acceptable connection fittings and methods to be used.

C.4.4.6 Ramp Rate

Where changing the diameter of the service does not prevent in the system constraints being violated, and a feasible higher-pressure tier connection is not available, an acceptable 'ramp rate' will be identified and the customer advised as one of the conditions of supply (the original service design (item 4.4.1) will be quoted when defining a 'ramp rate').

In some instances, the analyst will not have a finalised mains and service design, in which case assumptions will have to be made to complete a first iteration of the analysis. If a finalised design differs from the assumed design once the quotation is accepted, the analysis may require revision.

The ramp rate is a coarse term to describe the cycle that starts with the booster turning on to pressurise the downstream pipework to 100% burner flow.

For conventional burner type appliances e.g., boilers there are typically four stages, booster on to pressurise pipework (<1% flow), burner start-up/pre-purge (<1% flow), burner pilot (<20% flow), burner low fire <40% flow) and burner high fire (100% flow).

C.4.4.7 Snubbers

'Snubbers' or other short length increases in pipe diameter should not be used to mitigate the impact of compressors or boosters, as they are not considered effective in dissipating the transient wave.

C.5 Quotation

All assumptions made during the assessment of non-typical demands will be recorded and made clear in any quotation to the customer.

Appendix D Specification for Standard Pipe Code Table and New Lay Pipes

When undertaking the design of new system extensions or the review of a 3rd party submissions to be connected to a Wales & West Utilities network, the following pipe parameters should be used. As appropriate, Wales & West Utilities may allow supplementary pipes to be added to the list, i.e., where a UIP proposes to use a non-standard pipe size, which is considered suitable for adoption.

Table D.1: PE Pipes

The below values are common for both the design of new, and review of existing, PE pipes.

Nominal Diameter (mm)	Material	Internal Diameter (mm)	SDR	Pipe Efficiency Factor		
				Electro Fused & De-beaded	Butt Fused non-de-beaded 6	Butt Fused Non De-beaded 12
16	PE	11.15	7	0.97	-	-
20	PE	15.15	9	0.97	-	-
25	PE	20.15	11	0.97	-	-
32	PE	25.75	11	0.97	-	-
40	PE	32	11	0.97	-	-
63	PE	50.9	11	0.97	-	-
90	PE	79.2	17	0.97	-	-
125	PE	101.3	11	0.97	0.89	0.93
125	PE	110.3	17	0.97	0.89	0.93
180	PE	145.95	11	0.97	0.89	0.93
180	PE	158.75	17	0.97	0.89	0.93
250	PE	202.95	11	0.97	0.89	0.93
250	PE	220.75	17	0.97	0.89	0.93
250	PE	226.2	21	0.97	0.89	0.93
315	PE	255.75	11	0.97	0.89	0.93
315	PE	278.25	17	0.97	0.89	0.93
315	PE	285.0	21	0.97	0.89	0.93
355	PE	288.1	11	0.97	0.89	0.93
355	PE	313.5	17	0.97	0.89	0.93
355	PE	321.19	21	0.97	0.89	0.93
400	PE	327.27	11	0.97	0.89	0.93
400	PE	353.20	17	0.97	0.89	0.93
400	PE	361.90	21	0.97	0.89	0.93
450	PE	407.14	21	0.97	0.89	0.93
500	PE	409.09	11	0.97	0.89	0.93
500	PE	441.7	17	0.97	0.89	0.93
500	PE	452.38	21	0.97	0.89	0.93

Table D.2: Steel Pipes

Nominal Diameter (inch)	Material	Internal Diameter (mm)	Pipe Efficiency Factor		Mains or Service Design
			Fillet Welded Screwed	Butt Welded	
0.5	ST	19.93	0.86	-	S
0.75	ST	19.67	0.86	-	S
1	ST	26	0.86	-	M
1.25	ST	33.92	0.86	-	M
1.5	ST	38.67	0.86	-	M
2	ST	49.86	0.97	0.97	M
2.5	ST	65.43	-	0.97	M
3	ST	78.13	-	0.97	M
4	ST	103.53	-	0.97	M
6	ST	157.51	-	0.97	M
8	ST	206.38	-	0.97	M
10	ST	260.35	-	0.97	M
12	ST	311.15	-	0.97	M
16	ST	390.55	-	0.97	M
18	ST	441.35	-	0.97	M
20	ST	492.15	-	0.97	M
24	ST	593.75	-	0.97	M
30	ST	739.75	-	0.97	M
32	ST	793.75	-	0.97	M
36	ST	889	-	0.97	M
42	ST	1,066.8	-	0.97	M
48	ST	1,225.55	-	0.97	M

REFERENCES

Document Reference	IGEM Standards
IGEM/TD/3	Steel and PE Pipelines for Gas Distribution
IGEM/TD/4	PE and Steel Gas Services and Service Pipework
IGEM/GL/1	Planning of Distribution Systems
IGEM/GL/2	Planning of Transmission and Storage Systems of MOP >16 bar

Document Reference	Wales & West Utilities Policy, Procedures and Specifications
T/SP/NP/10	Specification for Defining Pipes as Mains, Services or Risers
T/PL/NP/16	Policy for Below 7 bar Network Analysis
T/PL/NP/18	Policy for Network Planning
WWSEI130	Safety & Engineering Instruction No: WWSEI130
WWUCPM	WWU'S Connection Policy Manual

Briefing Notes
3rd Party Connections Briefing Note 2 – Independent Gas Transporter (iGT) Process
3rd Party Connections Briefing Note 6 – Non-Typical loads.

Forms
Additional Load Information Form for Non-Typical Gas Demands

END NOTE