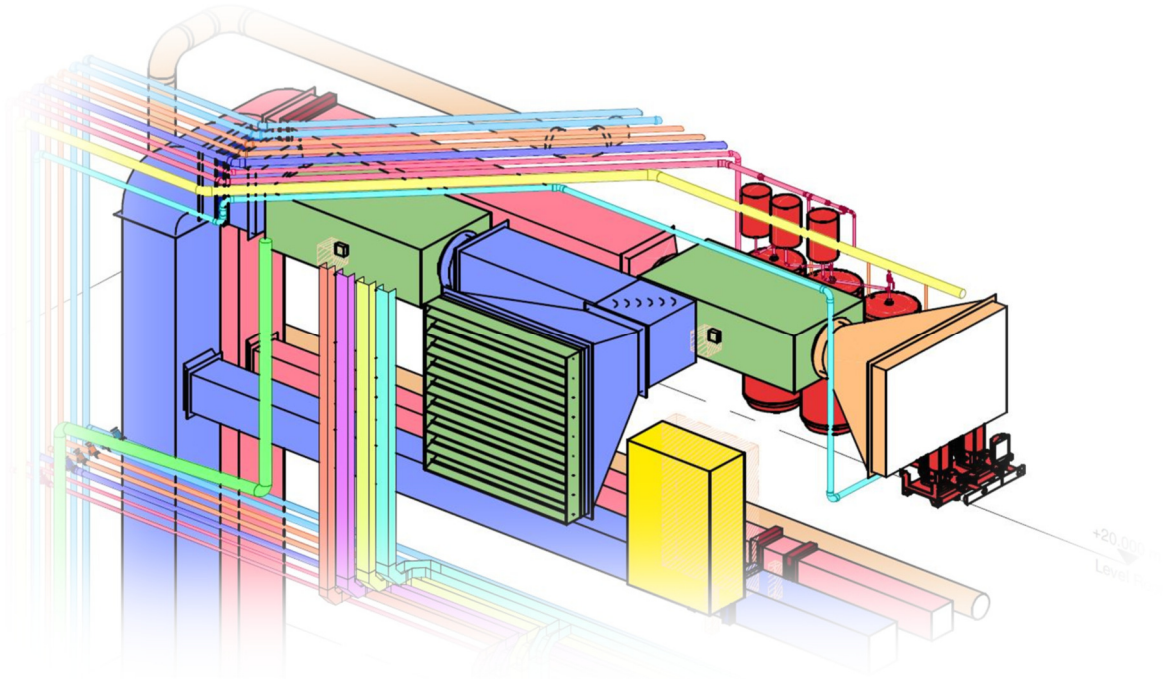
Society of
Digital Engineering

Standard Symbols – Systems



Society of Digital Engineering

Contents

Scope

To provide a consistent, systematic and easily understandable method of defining systems for building services. Including Mechanical, Electrical, Public Health and other system types that are commonly defined by building services engineers.

This will include:

- Abbreviations and definitions of common building services systems;
- Coloration of Pipe, Duct and Containment systems to allow visual differentiation between different system types. Provide an expandable methodology for creating a colour system; and
- Methods of showing systems using drawing and modelling techniques.

This will *not* include:

- Every possible system that may be defined by building services engineers;
- A definitive set of rules that are applicable in all circumstances; and
- Methods of showing and describing systems that are suitable for all software platforms.

System Colour Theory

The coloration of building services systems has steadily increased with the decrease in the cost of colour printing and with the increase in viewing drawn and modelled outputs on screen only. It assists the viewer by graphically demonstrating what each system is doing and helps the modeller connect systems together correctly, a task that was much more difficult using only black and white renditions of pipes, ducts and containment.

General

There are many methods of describing colours and several have been tested prior to this work being published. Most software platforms allow several methods of describing colour and this guidance will provide three methods of applying colour to building services systems:

- HSL (Hue, Saturation, Lightness)
- RGB (Red, Green, Blue)
- HEX (Hexadecimal)

The random application of colours to systems, or at least a non-systematic method, has been used for several years in different ways by different organisations. This is an attempt to apply a system to these colours. What has been found is that the HSL method of defining colour provides the easiest solution. Translation to other colour schemes can be achieved formulaically, or a webtool may be used, such as: https://www.w3schools.com/colors/colors_hsl.asp.

Using the HSL colour wheel, as shown below, different primary services have been given equally spaced segments around the wheel, in ten-degree inclinations in hue, the ‘H’ in HSL. This gives good visual discrimination between services and provides colours that look good together.

HSL colours may be defined in two ways, by angle for hue (H = 0 - 360) and percentage for saturation (S = 0 - 100) and lightness (L = 0 - 100), or by 8-bit values (0 – 255) for each. Software platforms may

use either of these methods. In this guide we have used angle, percentage, percentage. The table below shows an example of how to convert from angle, percentage, percentage to 8-bit:

	Hue	Saturation	Lightness
Angle, %, %	217	60%	71%
Formula	=ROUND((217/360)*255,0)	=ROUND(60%*255,0)	=ROUND(71%*255,0)
8-bit	154	153	181

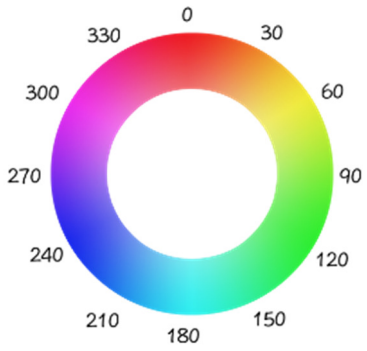


Figure 1 - HSL Colour Wheel

Differentiation between aspects of a system, such as between flow and return on a pipework system, has been achieved by varying the 'Lightness' variable, the 'L' in HSL.

Differentiating between related systems, such as different Low Temperature Hot Water pipework circuits, has been made by varying the 'Saturation' variable, the 'S' in HSL.

Mechanical

Mechanical systems have been divided into two groups, those generally carrying a gas (ductwork) and those generally carrying a liquid (pipework) and they have been treated slightly differently to assist in the visual differentiation between these two groups.

Ductwork

Ductwork systems should have a black outline and the colour is applied as a shade to the centre of the duct, i.e. colour fill. If a single line ductwork diagram is required, the colour should be applied to this single line.

Pipework

Pipework systems should have a colour outline, depicting the specific purpose of the system, e.g. LTHW-F (Low Temperature Hot Water *Flow*) and LTHW_R (Low Temperature Hot Water *Return*) shall have different but relatable colours. A consistent colour fill applied inside the outline to show the primary system type (e.g. LTHW Low Temperature Hot Water), so all pipework of a particular type will look similar, yet suitably differentiated for visual identification. If a single line pipework diagram is required, the outline colour should be applied to this single line.

Pipework does have some exceptions to the liquid carrying rule in that fuel gas, compressed air and medical gases should be defined in the same manner as other, liquid carrying, pipework systems.

Electrical

Electrical containment systems should have a black outline and have colour fill applied to denote the purpose of the cabling that is being contained, e.g. Low Voltage Cable Tray. If a single line containment diagram is required, the fill colour should be applied to this single line.

Electrical containment systems include cable tray, cable ladder, cable basket (also referred to as 'steel wire cable tray'), busbar, trunking and conduit. If visual differentiation between tray, ladder and basket is required, the patterns below may be used, though this may not be possible in all software platforms:

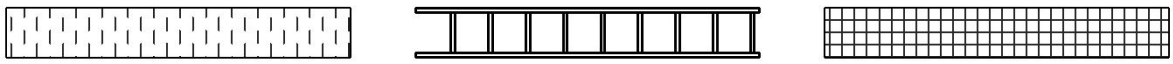


Figure 2 - Cable tray, cable ladder and cable basket

Public Health

Public Health pipework follows the same rules as Mechanical pipework.

Others

Any other system type will be a form of ductwork, pipework or containment and should be treated as set out above.

System Abbreviation Theory

Traditionally abbreviations have been used in similar but slightly differing ways in building services engineering. This is an attempt at rationalising system abbreviations and applying a consistent logic to them.

The abbreviations shown here use common methods of abbreviation, such as a secondary letter used from an abbreviated word is shown in lower case, e.g. 'Doctor' is abbreviated to 'Dr', equally 'Chilled' is abbreviated to 'Ch'.

Some abbreviations require different parts to be separated. For example, Low Temperature Hot Water Flow is abbreviated to LTHW_F. We have standardised on using the underscore character ('_') as the field delimiter. That is the purpose of the underscore character and it has only one Unicode character code, so can be machine read. Some organisations use the dash character ('-') as a delimiter, this character has over twenty different Unicode character codes (types of dash), making machine reading more difficult.

Equipment and Accessories

To assist the readability of models, it is desirable to easily identify equipment and accessories associated with systems. To achieve this, it is necessary to provide some form of simple visual identification.

The identification of equipment may be achieved by the application of colour, based on the primary function of that equipment. The table below suggests a method of classifying the equipment in a model and some colours that may be used to aid identification:

Equipment	Outline	HSL	RGB	HEX	Fill	HSL	RGB	HEX
Cooling		0, 0%, 0%	0, 0, 0	#000000		217, 60%, 71%	135, 170, 225	#87aae1
Domestic		0, 0%, 0%	0, 0, 0	#000000		274, 39%, 65%	170, 130, 200	#aa82c8
Electrical		0, 0%, 0%	0, 0, 0	#000000		55, 100%, 50%	255, 235, 000	#ffeb00
Heating		0, 0%, 0%	0, 0, 0	#000000		0, 78%, 55%	230, 050, 050	#e63232
Ventilation		0, 0%, 0%	0, 0, 0	#000000		103, 39%, 65%	150, 200, 130	#96c882

Equipment is not directly related to system types, as most equipment is connected to more than one system, for example an air handling unit will have connections from several types of ductwork system, heating and cooling pipework systems, condensate drainage and electrical systems.

System accessories are connected to single systems, so these may have a relationship with the system into which they are placed. Accessories will only be found on pipework and ductwork systems, with components such as dampers, reheat coils and valves. A table of pipe and duct accessory colours may be found at the end of this guide.

Special cases

There are some cases in which the visualisation of systems or parts of systems needs to vary. This may be due to the construction of parts of the system, or it may be due to limitations in the software used to generate the pipes, ducts or cable containment systems.

Flexible Duct appearance

Ideally, flexible ductwork should be shown with similar coloration as the rest of the system to which it is connected. This may not be possible in all modelling software. If the connecting solid duct system has colour applied, it should be obvious that the flexible portion is of that system and this lack of colour may be safely ignored.

Also, flexible ductwork should be shown in a relatively realistic manner, but if the software does not allow this, representation that obviously differentiates it from solid duct is also acceptable. Some example representations are shown below:

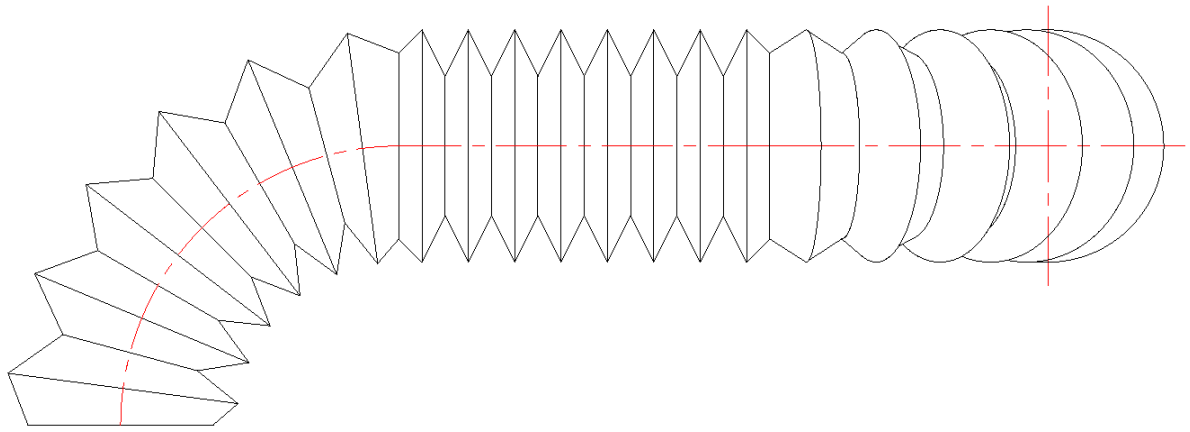


Figure 3 - Ideal representation

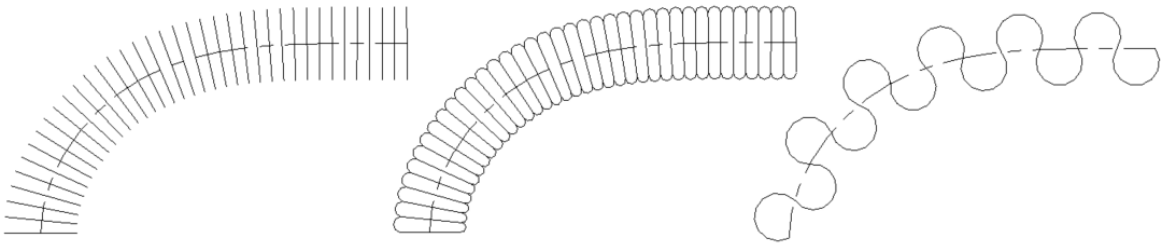


Figure 4 - Alternative representations

Insulation appearance

Where insulation is to be shown on ductwork and pipework runs, it should be differentiated from the duct or pipe itself by application of transparency, so the underlying line of the duct or pipe is visible. It should also inherit the shade of the duct or pipe system.

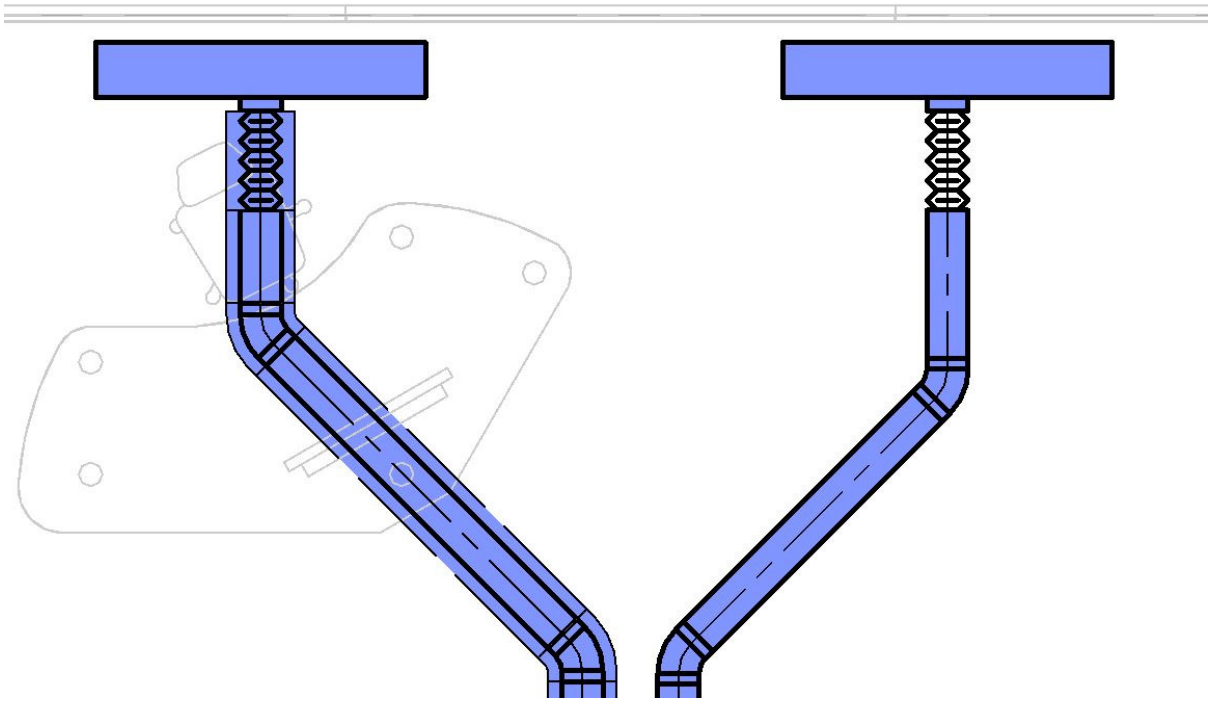


Figure 5 – Insulated and uninsulated duct - Plan view

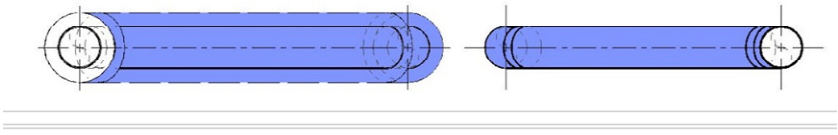


Figure 6 - Insulated and uninsulated duct - Section view

Fire Resistant Duct appearance

Graphically demonstrating that a ductwork section is clad in fire resistant board or sprayed with a fire retardant, is an important part of telling the fire strategy story. As such it is important for this to be easily recognisable in models and on drawings.

Not all software will necessarily be able to easily generate these graphics, in which case annotation should define which duct segments are fire resistant.

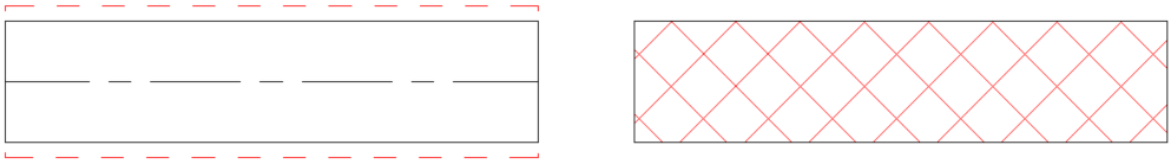


Figure 7 - Alternatives for Fire Cladding

The above is an example of fire cladding, different renditions may be required within a single model to demonstrate different fire ratings, based on the example shown here.

Acoustic lining may follow similar principles to fire cladding. This must be suitably different in nature to fire cladding to cover the instance of both fire cladding and acoustic insulation being required.

How to show Clearance Zones

For building services to be adequately co-ordinated, it is important to demonstrate clearances around equipment, accessories and systems. A suggested example of how this may be achieved is shown below:

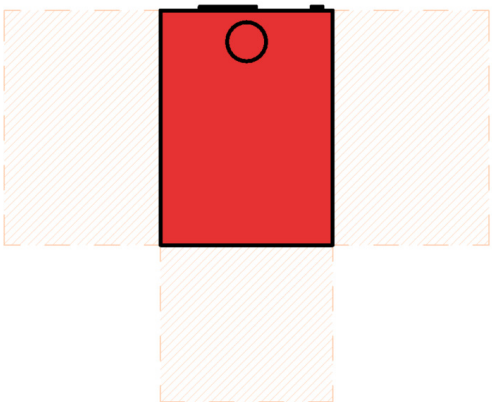


Figure 8 - Clearance - Plan view

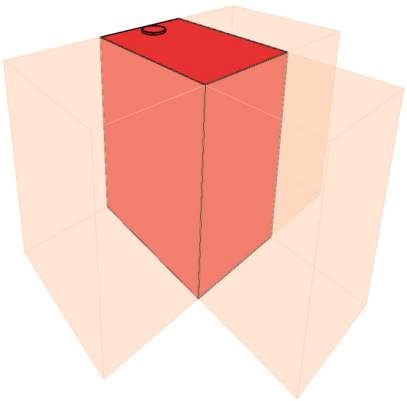


Figure 9 - Clearance - 3D view

Equipment	Outline	HSL	RGB	HEX	Fill	HSL	RGB	HEX
Clearance		24, 100%, 77%	255, 185, 138	#ffb98a		As outline, 50% transparency		

Systems and Abbreviations

Mechanical Systems

Pipework

System	Abbreviation	Definition	Classification
Chilled Water	ChW	Deliberately cooled water for the purpose of cooling spaces or machinery.	Ss_60_40_17_12
Chilled Water Flow	ChW_F	Chilled water pipework prior to cooling work being done in a space or piece of machinery.	Ss_60_40_17_12
Chilled Water Return	ChW_R	Chilled water pipework returning water that has done cooling work on a space or piece of machinery.	Ss_60_40_17_12
Condensate	Cond	Pipework for the removal of water liberated from air at saturation point.	
Condenser Water	CdW	Water system to which heat is rejected by plant and used to transfer that heat energy to atmosphere or another process.	
Condenser Water Flow	CdW_F	As CdW, flow pipework system. i.e from heat rejection plant.	
Condenser Water Return	CdW_R	As CdW, return pipework system. i.e. to heat rejection plant.	
Ground Water Source	GdWS	Pipework system extracting thermal energy from ground water.	Ss_60_40_36_96
Ground Water Source Flow	GdWS_F	Pipework carrying ground water from source to a heat exchanger.	Ss_60_40_36_96
Ground Water Source Return	GdWS_R	Pipework returning water from a heat exchanger to the ground.	Ss_60_40_36_96
Heat Transfer Water	HTW	Pipework system carrying water-bound energy between a heat exchanger and a heat pump.	Ss_60_40_36_96
Heat Transfer Water Flow	HTW_F	Heat transfer pipework from heat exchanger to heat pump.	Ss_60_40_36_96
Heat Transfer Water Return	HTW_R	Heat transfer pipework from heat pump to heat exchanger.	Ss_60_40_36_96
Low Temperature Hot Water	LTHW	Deliberately heated water for the purpose of heating a space or machinery. LTHW temperatures are always higher than heated room / room design	Ss_60_40_37_48

		temperatures and not higher than 90°C. Also known as Low Pressure Hot Water.	
Low Temperature Hot Water Flow	LTHW_F	Heating water pipework prior to heating work being done in a space or piece of machinery.	Ss_60_40_37_48
Low Temperature Hot Water Return	LTHW_R	Heating water pipework returning water that has done heating work on a space or piece of machinery.	Ss_60_40_37_48
Refrigerant	Rf	Phase change fluid system, usually used for cooling spaces or machinery, may be used for heating.	Ss_60_40_17_71
Refrigerant Gas	Rf_G	Refrigerant pipework containing refrigerant fluid in gaseous phase, for cooling applications this would be after cooling work being done.	Ss_60_40_17_71
Refrigerant Liquid	Rf_L	Refrigerant pipework containing refrigerant fluid in liquid phase, for cooling applications this would be prior to cooling work being done.	Ss_60_40_17_71
Solar Hot Water	SHW	Primary hot water pipework system moving solar heated water between solar collector panel/array and heat exchanger/storage.	Ss_60_40_37_81
Solar Hot Water Flow	SHW_F	Pipework from solar collector to heat exchanger/storage.	Ss_60_40_37_81
Solar Hot Water Return	SHW_R	Pipework from heat exchanger/storage to solar collector.	Ss_60_40_37_81
Steam	St	Pipework system containing steam for heating or process work.	Ss_60_40_37_85
Steam Flow	St_F	Steam pipework containing steam prior to work being done.	Ss_60_40_37_85
Steam Condensate	St_C	Steam pipework containing returning water.	Ss_60_40_37_85
Surface Water Source	SWS	Pipework system extracting thermal energy from surface water.	Ss_60_40_36_96
Surface Water Source Flow	SWS_F	Pipework carrying surface water from source to a heat exchanger.	Ss_60_40_36_96

Surface Water Source Return	SWS_R	Pipework returning water from a heat exchanger to the surface source.	Ss_60_40_36_96
Variable Refrigerant Flow System	Rf_VF	Refrigerant pipework system containing a variable flow of refrigerant fluid.	Ss_60_40_17_94
Variable Refrigerant Flow Gas	Rf_VF_G	Refrigerant pipework containing a variable flow of refrigerant fluid in gaeous phase	Ss_60_40_17_94
Variable Refrigerant Flow Liquid	Rf_VF_L	Refrigerant pipework containing a variable flow of refrigerant fluid in liquid phase.	Ss_60_40_17_94
Ductwork			
Discharge Air	DA	Air from air handling equipment to atmosphere. Synonym: Exhaust Air	Ss_65_40_42_45
Extract Air	EA	Air removed from a space to air handling equipment. Synonym: Return Air	Ss_65_40_33_50
Intake Air	IA	Air from outside a building provided for the purpose of occupant respiration or to replace extracted air. Synonyms: Fresh Air, Outside Air	
Supply Air	SA	Air, possibly treated, provided for ventilation, heating and/or cooling of a space. Air from air handling equipment to a space.	Ss_65_40_33_51

Public Health Systems

Domestic Water

System	Abbreviation	Definition	Classification
Boosted Cold Water	BCW	Cold Water pipework with artificially increased pressure.	Ss_55_70_38_15
Domestic Hot Water	DHW	Deliberately heated water for the purpose of providing domestic hot water. Synonym: HWS.	Ss_55_70_38_42
Domestic Hot Water Flow	DHW_F	Domestic Hot Water Flow pipework.	Ss_55_70_38_42
Domestic Hot Water Return	DHW_R	Domestic Hot Water Return pipework.	Ss_55_70_38_42

Grey Water	GW	Water having served a primary purpose being re-used in a secondary function.	Ss_55_70_97_35
Mains Cold Water	MCW	Cold Water pipework fed directly from the water company main.	Ss_55_70_38_15
Recycled Cold Water	RCW	Similar to Grey Water, but may have additional Rainwater and Cold Water added.	

Drainage

System	Abbreviation	Definition	Classification
Grey Water Pipe	GWP	Water having served a primary purpose to treatment equipment or storage prior to being re-used in a secondary function.	
Rain Water Pipe	RWP	Above ground pipework for removing surface water.	Ss_50_30_02
Soil Vent Pipe	SVP	Above ground pipework for the removal of foul water, also often acting as a ventilation pipe.	Ss_50_30_04_97
Vent Pipe	VP	Above ground pipework for ventilation waste or soil drainage stacks. Synonym: Anti-Siphon Pipe ASP.	

Fire Fighting

System	Abbreviation	Definition	Classification
Fire Fighting Dry Riser	FiDR	Pipework for fire fighting systems, normally without water.	Ss_55_30_96_25
Fire Fighting Foam	FiF	Fire fighting system utilising foam agents to extinguish a fire.	Ss_55_30_35_31
Fire Gaseous Suppression	FiGS	Fire fighting system utilising gas to extinguish a fire.	Ss_55_30_35_40
Fire Sprinkler Dry Pipe	FiSp_DP	Fire fighting sprinkler system pipework, normally without water.	Ss_55_30_98_85
Fire Sprinkler Main	FiSp_M	Fire fighting sprinkler system water main.	Ss_55_30_98_85
Fire Sprinkler Pre-Action	FiSp_PA	Fire fighting sprinkler system that fills with water prior to activation.	Ss_55_30_98_85
Fire Sprinkler Water Mist	FiSp_WM	Fire fighting system utilising water mist to extinguish a fire.	Ss_55_30_98_96
Fire Sprinkler Wet Pipe	FiSp_WP	Fire fighting sprinkler system pipework, normally with water.	Ss_55_30_98_85

Fire Fighting Wet Riser	FiWR	Pipework for fire fighting systems, normally with water.	Ss_55_30_96_97
Fuels			
System	**Abbreviation**	**Definition**	**Classification**
Fuel Oil	FO	Pipework carrying combustible liquid hydrocarbons to power equipment.	Ss_55_50_47_32
Fuel Oil Diesel	FO_D	Fuel Oil System specifically for Diesel fuel.	Ss_55_50_47_21
Natural Gas	NG	Pipework containing natural gas for combustion.	Ss_55_20_33_56
Medical Gases			
System	**Abbreviation**	**Definition**	**Classification**
Medical Gas Services	MG	Pipework carrying gases for medical purposes.	Ss_55_20_51
Anaesthetic Gas Scavenging	MG_AGS	Pipework for anaesthetic gas scavenging system.	Ss_55_20_51_03
Carbon dioxide	MG_CO2	Pipework for carbon dioxide supply.	
Medical Air	MG_MA	Pipework for medical air supply.	
Medical Vacuum	MG_MV	Pipework for medical vacuum.	
Nitrogen	MG_N2	Pipework for nitrogen supply.	
Nitrogen Dioxide	MG_N2O	Pipework for nitrous oxide supply.	Ss_55_20_51_56
Oxygen	MG_O2	Pipework for oxygen supply.	Ss_55_20_51_59
Other			
System	**Abbreviation**	**Definition**	**Classification**
Compressed Air	CA	Pipework system for the delivery of air at above atmospheric pressure.	Ss_55_20_15

Electrical Systems

Containment

System	Abbreviation	Definition	Classification
Audio Visual	AV	Cabling for audio recording or playback equipment and display equipment.	
Building Management Systems	BMS	Building controls and management cabling.	Ss_70_54_10
Communications	Comms	Cabling for telecommunications systems.	Ss_75_10_21_88
Data		Cabling for data and IT systems.	Ss_75_10_21_21
Fire Alarm	FA	Cabling for fire detection and alarm systems.	Ss_75_50_28_29
Lighting	Ltg	Cabling for Lighting circuits.	Ss_70_80
Power – HV	HV	Power cables with circuit voltage normally exceeding low voltage.	Ss_70_30_35_35
Power – LV	LV	Power cables with circuit voltage exceeding Extra Low Voltage but not exceeding 1000V a.c. or 1500V d.c. between conductors or 600V a.c. or 900V d.c. between conductors and earth.	Ss_70_30_45_45
Power – ELV	ELV	Power cables with circuit voltage not exceeding 50V a.c. or 120V ripple free d.c. whether between conductors or to Earth.	
Security	Sec	Cabling for security systems.	Ss_75_40

Systems and Colouration

Note: only the most common systems have been given colours, other systems should have colour applied on a project by project, or company standard basis.

Service	Outline	HSL	RGB	HEX	Fill	HSL	RGB	HEX
Ductwork								
Discharge Air		0, 0%, 0%	0, 0, 0	#000000		30, 100%, 75%	255, 191, 128	#ffbf80
Extract Air		0, 0%, 0%	0, 0, 0	#000000		350, 100%, 75%	255, 128, 149	#ff8095
Intake Air		0, 0%, 0%	0, 0, 0	#000000		190, 100%, 50%*	0, 213, 255	#00d5ff
Supply Air		0, 0%, 0%	0, 0, 0	#000000		230, 100%, 75%	128, 149, 255	#8095ff
*** Intake air colour fill does not follow rules exactly, as the resulting colour is too pale when printed.**								
Pipework								
Boosted Cold Water		240, 100%, 30%	0, 0, 153	#000099		240, 100%, 75%	128, 128, 255	#8080ff
Chilled Water Flow		200, 100%, 30%	0, 102, 153	#006699		200, 100%, 75%	128, 212, 255	#80d4ff
Chilled Water Return		200, 100%, 45%	0, 153, 230	#0099e6		200, 100%, 75%	128, 212, 255	#80d4ff
Compressed Air		220, 100%, 30%	0, 51, 153	#003399		220, 100%, 75%	128, 170, 255	#80aaff
Condensate Pipe		320, 100%, 30%	153, 0, 102	#990066		320, 100%, 75%	255, 128, 213	#ff80d5
Condenser Water Flow		280, 100%, 30%	102, 0, 153	#660099		280, 100%, 75%	213, 128, 255	#d580ff
Condenser Water Return		280, 100%, 45%	153, 0, 230	#9900e6		280, 100%, 75%	213, 128, 255	#d580ff
Domestic Hot Water Flow		340, 100%, 30%	153, 0, 51	#990033		340, 100%, 75%	255, 128, 170	#ff80aa
Domestic Hot Water Return		340, 100%, 45%	230, 0, 76	#e6004c		340, 100%, 75%	255, 128, 170	#ff80aa
Fire Protection System (sprinklers)		0, 100%, 50%	255, 0, 0	#ff0000		0, 100%, 75%	255, 128, 128	#ff8080
Fuel Oil		140, 100%, 30%	0, 153, 51	#009933		140, 100%, 75%	128, 255, 170	#80ffaa
Grey Water		80, 100%, 30%	102, 153, 0	#669900		80, 100%, 75%	213, 255, 128	#d5ff80
Low Temperature Hot Water Flow		20, 100%, 30%	153, 51, 0	#993300		20, 100%, 75%	255, 170, 128	#ffaa80
Low Temperature Hot Water Return		20, 100%, 45%	230, 77, 0	#e64d00		20, 100%, 75%	255, 170, 128	#ffaa80
Mains Cold Water		180, 100%, 30%	0, 153, 153	#009999		180, 100%, 75%	128, 255, 255	#80ffff
Natural Gas		60, 100%, 30%	153, 153, 0	#999900		60, 100%, 75%	255, 255, 128	#ffff80
Rain Water Pipe		120, 100%, 30%	0, 153, 0	#009900		120, 100%, 75%	128, 255, 128	#80ff80
Recycled Cold Water		300, 100%, 30%	153, 0, 153	#990099		300, 100%, 75%	255, 128, 255	#ff80ff

Refrigerant Gas		160, 100%, 45%	0, 230, 153	#00e699		160, 100%, 75%	128, 255, 212	#80ffd4
Refrigerant Liquid		160, 100%, 30%	0, 153, 102	#009966		160, 100%, 75%	128, 255, 212	#80ffd4
Soil Vent Pipe		40, 100%, 30%	153, 102, 0	#996600		40, 100%, 75%	255, 212, 128	#ffd480
Containment								
Audio Visual		0, 0%, 0%	0, 0, 0	#000000		330, 100%, 75%	255, 128, 191	#ff80bf
BMS		0, 0%, 0%	0, 0, 0	#000000		150, 100%, 75%	128, 255, 191	#80ffbf
Communications		0, 0%, 0%	0, 0, 0	#000000		310, 100%, 75%	255, 128, 234	#ff80ea
Data		0, 0%, 0%	0, 0, 0	#000000		290, 100%, 75%	234, 128, 255	#ea80ff
Fire Alarm		0, 0%, 0%	0, 0, 0	#000000		10, 100%, 75%	255, 149, 128	#ff9580
Lighting		0, 0%, 0%	0, 0, 0	#000000		70, 100%, 75%	234, 255, 128	#eaff80
Power – HV		0, 0%, 0%	0, 0, 0	#000000		250, 100%, 75%	149, 128, 255	#9580ff
Power – LV		0, 0%, 0%	0, 0, 0	#000000		210, 100%, 75%	128, 191, 255	#80bfff
Power – ELV		0, 0%, 0%	0, 0, 0	#000000		170, 100%, 75%	128, 255, 234	#80ffea
Security		0, 0%, 0%	0, 0, 0	#000000		50, 100%, 75%	255, 234, 128	#ffea80

Accessories and Colouration

Service	Outline	HSL	RGB	HEX	Fill	HSL	RGB	HEX
Ductwork								
Discharge Air		0, 0%, 0%	0, 0, 0	#000000		30, 100%, 30%	153, 77, 0	#994d00
Extract Air		0, 0%, 0%	0, 0, 0	#000000		350, 100%, 30%	153, 0, 26	#99001a
Intake Air		0, 0%, 0%	0, 0, 0	#000000		190, 100%, 30%	0, 128, 153	#008099
Supply Air		0, 0%, 0%	0, 0, 0	#000000		230, 100%, 30%	0, 25, 153	#001999
Pipework								
Boosted Cold Water		240, 100%, 30%	0, 0, 153	#000099		240, 100%, 30%	0, 0, 153	#000099
Chilled Water Flow		200, 100%, 30%	0, 102, 153	#006699		200, 100%, 30%	0, 102, 153	#006699
Chilled Water Return		200, 100%, 45%	0, 153, 230	#0099e6		200, 100%, 45%	0, 153, 230	#0099e6
Compressed Air		220, 100%, 30%	0, 51, 153	#003399		220, 100%, 30%	0, 51, 153	#003399
Condensate Pipe		320, 100%, 30%	153, 0, 102	#990066		320, 100%, 30%	153, 0, 102	#990066
Condenser Water Flow		280, 100%, 30%	102, 0, 153	#660099		280, 100%, 30%	102, 0, 153	#660099
Condenser Water Return		280, 100%, 45%	153, 0, 230	#9900e6		280, 100%, 45%	153, 0, 230	#9900e6
Domestic Hot Water Flow		340, 100%, 30%	153, 0, 51	#990033		340, 100%, 30%	153, 0, 51	#990033
Domestic Hot Water Return		340, 100%, 45%	230, 0, 76	#e6004c		340, 100%, 45%	230, 0, 76	#e6004c
Fire Protection System (sprinklers)		0, 100%, 50%	255, 0, 0	#ff0000		0, 100%, 50%	255, 0, 0	#ff0000
Fuel Oil		140, 100%, 30%	0, 153, 51	#009933		140, 100%, 30%	0, 153, 51	#009933

Grey Water		80, 100%, 30%	102, 153, 0	#669900		80, 100%, 30%	102, 153, 0	#669900
Low Temperature Hot Water Flow		20, 100%, 30%	153, 51, 0	#993300		20, 100%, 30%	153, 51, 0	#993300
Low Temperature Hot Water Return		20, 100%, 45%	230, 77, 0	#e64d00		20, 100%, 45%	230, 77, 0	#e64d00
Mains Cold Water		180, 100%, 30%	0, 153, 153	#009999		180, 100%, 30%	0, 153, 153	#009999
Natural Gas		60, 100%, 30%	153, 153, 0	#999900		60, 100%, 30%	153, 153, 0	#999900
Rain Water Pipe		120, 100%, 30%	0, 153, 0	#009900		120, 100%, 30%	0, 153, 0	#009900
Recycled Cold Water		300, 100%, 30%	153, 0, 153	#990099		300, 100%, 30%	153, 0, 153	#990099
Refrigerant Gas		160, 100%, 45%	0, 230, 153	#00e699		160, 100%, 45%	0, 230, 153	#00e699
Refrigerant Liquid		160, 100%, 30%	0, 153, 102	#009966		160, 100%, 30%	0, 153, 102	#009966
Soil Vent Pipe		40, 100%, 30%	153, 102, 0	#996600		40, 100%, 30%	153, 102, 0	#996600

Secondary systems examples

The below is a series of possible examples to illustrate the process of modifying the base colours of various system types to denote subsets of those systems. Unless these specific system types are commonly used in the day-to-day working of the organisation, it is not recommended that these sub-systems be built into project templates or workflows and be assessed on a case by case basis.

Service	Outline	HSL	RGB	HEX	Fill	HSL	RGB	HEX
Discharge Ductwork								
Discharge Air		0, 0%, 0%	0, 0, 0	#000000		30, 100%, 75%	255, 191, 128	#ffbf80
Toilet Extract		0, 0%, 0%	0, 0, 0	#000000		30, 80%, 75%	242, 191, 140	#f2bf8c
Kitchen Extract		0, 0%, 0%	0, 0, 0	#000000		30, 60%, 75%	230, 191, 153	#e6bf99
Fume Cupboard Extract		0, 0%, 0%	0, 0, 0	#000000		30, 40%, 75%	217, 191, 166	#d9bfa6
Flue		0, 0%, 0%	0, 0, 0	#000000		30, 20%, 75%	204, 191, 179	#ccbfb3
LTHW Pipework								
LTHW_F		20, 100%, 30%	153, 51, 0	#993300		20, 100%, 75%	255, 170, 128	#ffaa80
LTHW_R		20, 100%, 45%	230, 77, 0	#e64d00		20, 100%, 75%	255, 170, 128	#ffaa80
LTHW_F_FanCoils		20, 80%, 30%	138, 56, 15	#8a380f		20, 80%, 75%	242, 174, 140	#f2ae8c
LTHW_R_FanCoils		20, 80%, 45%	207, 84, 23	#cf5417		20, 80%, 75%	242, 174, 140	#f2ae8c
LTHW_F_Radiators		20, 60%, 30%	122, 61, 31	#7a3d1f		20, 60%, 75%	230, 179, 153	#e6b399
LTHW_R_Radiators		20, 60%, 45%	184, 92, 46	#b85c2e		20, 60%, 75%	230, 179, 153	#e6b399

Use examples

Duct Line Components

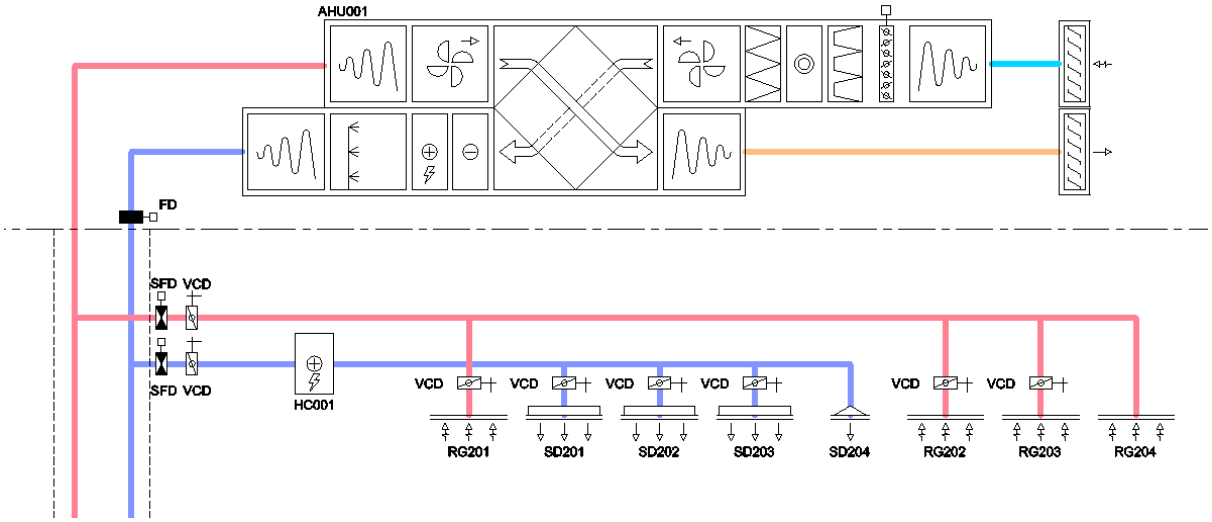


Figure 10 - Ventilation Schematic

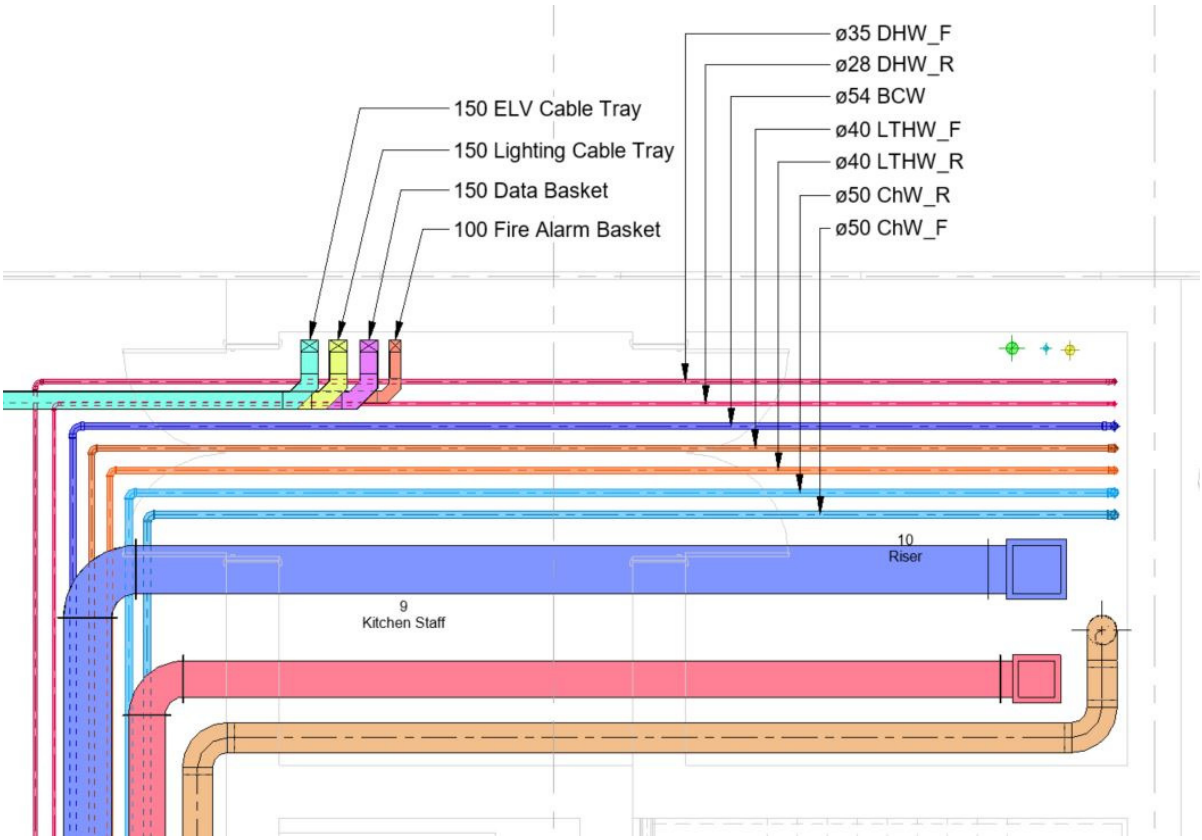


Figure 11 - Combined Services - Double line

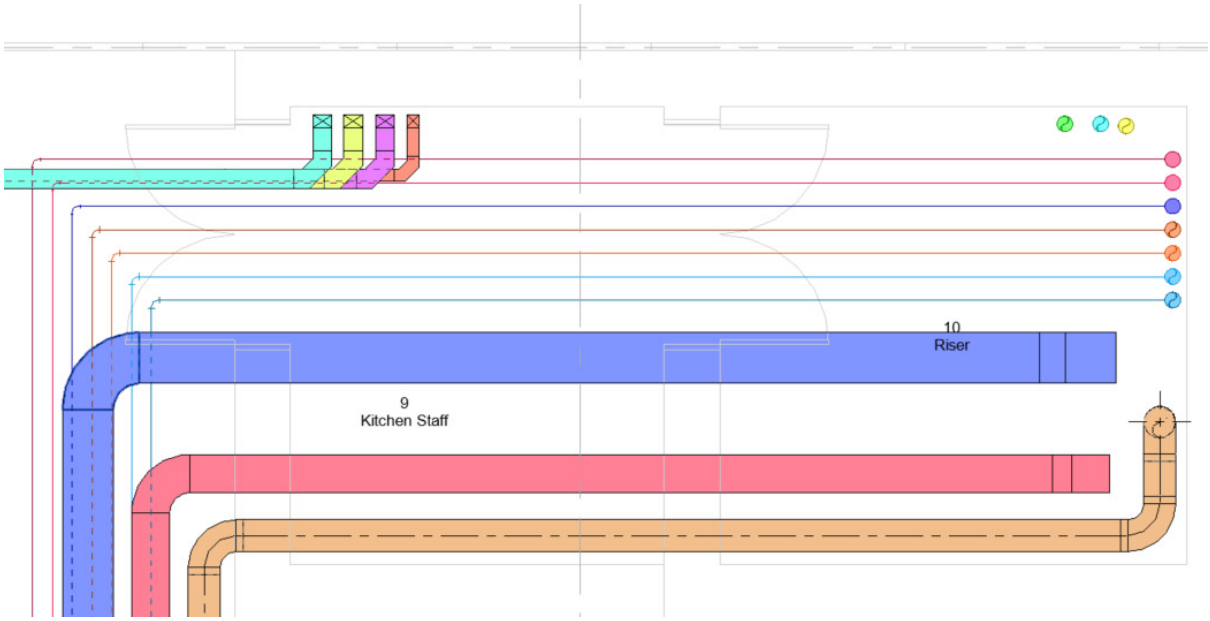


Figure 12 - Combined Services - Single line pipework

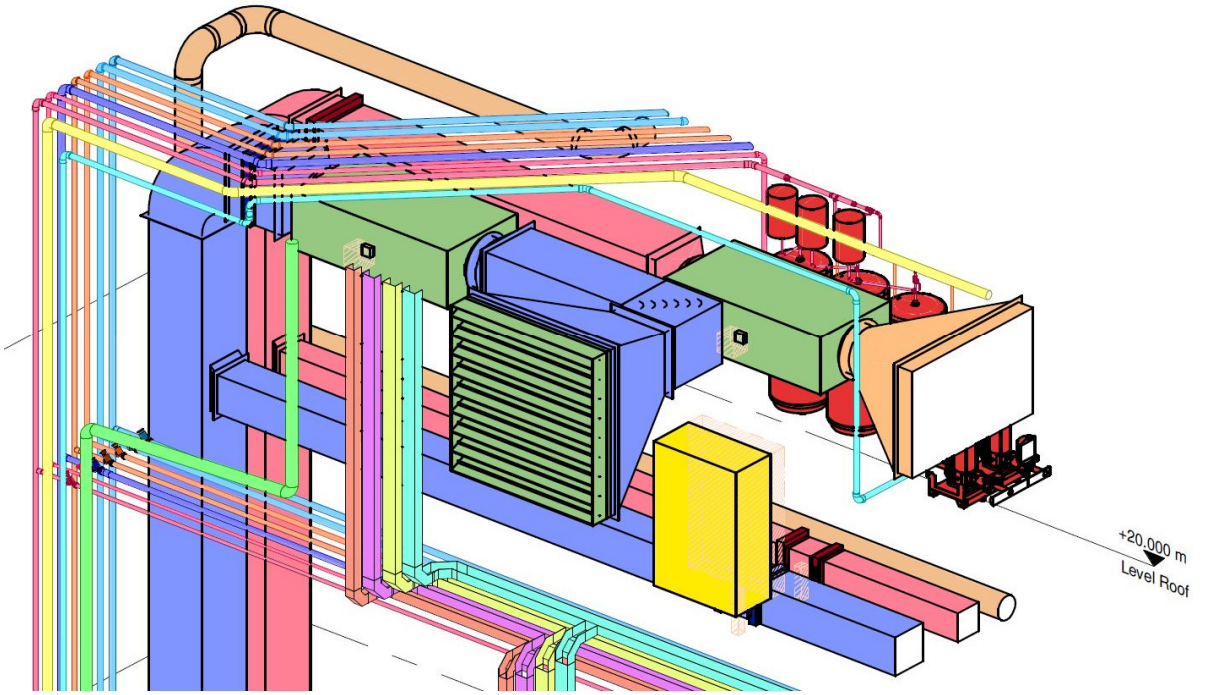


Figure 13 - Combined services - 3D View

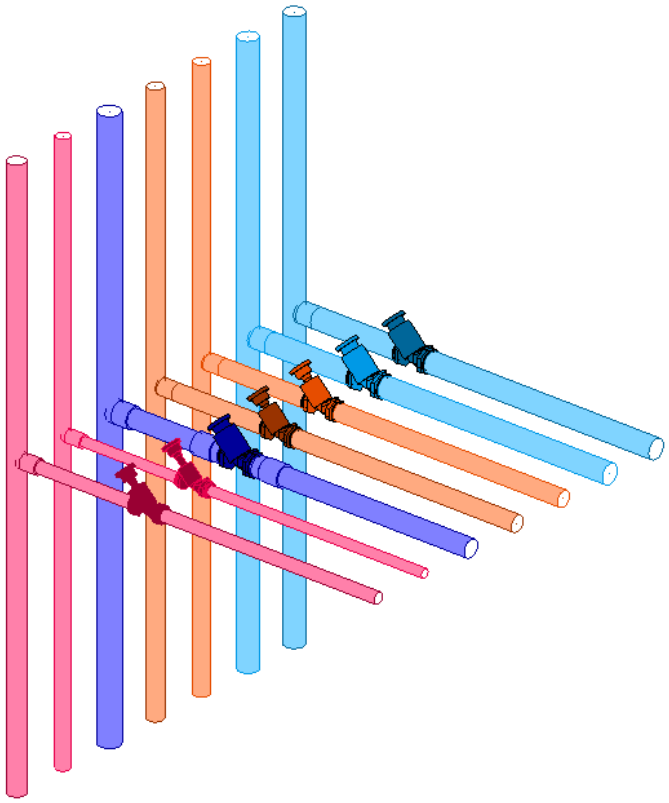


Figure 14 - Pipework Accessories - 3D view