

Technical Note

Project Title	Harlington School		
Subject	Planning Condition Section 20 Energy	Date	05/11/20
Author	CFMP	Our Ref	1422EHA-18-210929

The attached documents represent the complying documents required to fulfil the planning condition section 20 – Energy: “Prior to the commencement of above ground construction works (excluding demolition and site clearance), full details of the low and zero carbon technology required to meet the CO2 reductions identified in the Energy and Sustainability Strategy Rev. P01 (Dated August 2020) shall be submitted and approved in writing by the Local Planning Authority. The details shall include full specifications, locations of equipment and associated emissions (noise/odour/gas). Thereafter the development shall be carried out and maintained in full accordance with the approved details.”

The documents attached are the full specification and layouts for the:

- Heating Plant Room Layout
- Boiler Datasheet
- Roof PV layout
- PV datasheet - 415Wp

TECHNICAL DATA SHEET

PRODUCT: Buderus GB402 Boiler

GB402 Floor Standing Condensing Boiler:

GB402 – 320	66.7	– 320.0kW @50/30
GB402 – 395	80.5	– 395.0kW @50/30
GB402 – 470	95.6	– 468.8kW @50/30
GB402 – 545	113.0	– 545.0kW @50/30
GB402 – 620	127.6	– 621.4kW @50/30



- ▶ Individual Boiler outputs from 320-630kW
- ▶ Suitable for installation in multiple boiler cascades
- ▶ Highest efficiency up to 110% (NCV), 96% Seasonal efficiency (L2B)
- ▶ Aluminium heat exchanger
- ▶ Modulating pre-mix gas burner with NOx emissions of 40mg/kWh
- ▶ Easy transport, assembly and installation
- ▶ Simple service and maintenance
- ▶ SAFe – Digital combustion control
- ▶ Energy Management system (EMS) controls
- ▶ Extremely quiet with noise levels below 60 db(A) at full load

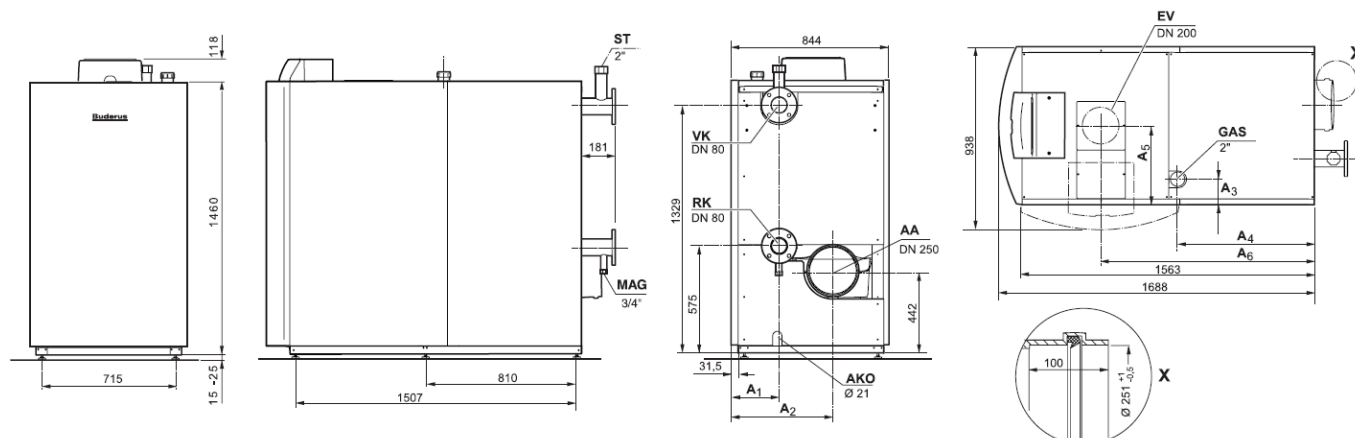
Whilst it is always our intention to fully assist, it is essential to recognise that all information given by the company in response to an enquiry of any nature is provided in good faith and based upon the information provided with the enquiry. We recommend that advice should always be checked with your installer or contract partner. Consequently, the company cannot be held responsible for any liability relating to the use or repetition of such information or part thereof. In addition, whilst making every reasonable effort to monitor the performance and quality of our supply, installation and service network, we do not accept responsibility for the workmanship or operation of any third party company that the company may have promoted either in conversation, e-mail or other communication.

Similarly, the views and opinions expressed in communication with individuals within the company may not reflect that of the business as a whole.

TECHNICAL DATA SHEET

PRODUCT: Buderus GB402 Boiler

GB402 Dimensions:



GB402		Unit	320	395	470	545	620
Height (max incl Controls)		mm	1593 - 1603				
Depth*		mm	844 - 938*				
Width*		mm	1744 - 1869*				
Transport (WxDxH)		mm	781x1740x1542				
Clearance (Boiler feet)		mm	1507				
Weight (excluding casing)		kg	410	438	465	493	520
Condensate outlet	AKO	Inch	3/4	3/4	3/4	3/4	3/4
Flue gas connection	Ø D _{AA}		DN250	DN250	DN250	DN250	DN250
	H _{AA}	mm	442	442	442	442	442
	A ₂	mm	542.5	542.5	542.5	542.5	542.5
Boiler flow connection	Ø VK	mm	DN80	DN80	DN80	DN80	DN80
	H _{VK}	mm	1329	1329	1329	1329	1329
	A ₁	mm	251.5	251.5	251.5	251.5	251.5
Boiler return connection	Ø RK	mm	DN80	DN80	DN80	DN80	DN80
	H _{RK}	mm	575	575	575	575	575
	A ₁	mm	251.5	251.5	251.5	251.5	251.5
Gas connection	Ø GAS	Inch	R2	R2	R2	R2	R2
	A ₃	mm	135	135	135	135	135
	A ₄	mm	732	732	732	732	732
**Safety valve connection	ST	Inch	R2	R2	R2	R2	R2
Balanced flue connection **(Optional)	Ø EV	mm	DN200	DN200	DN200	DN200	DN200
	A ₅	mm	422	422	422	422	422
	A ₆	mm	1142	1142	1142	1142	1142

*Width and depth dimensions are dependent on orientation of boiler controls.

**Safety equipment and balanced flue connection pieces available as an accessory, for more information please contact your local sales manager.

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TECHNICAL DATA SHEET

PRODUCT: Buderus GB402 Boiler

GB402 Technical Specification:

GB402		Unit	320	395	470	545	620
Nominal heat output @ 50/30 °C	Full load	kW	320.0	395.0	468.2	545.0	621.4
	Part load	kW	66.7	80.5	95.6	113.0	127.6
Nominal heat output @ 80/60 °C	Full load	kW	297.2	367.4	435.8	507.0	577.1
	Part load	kW	58.9	72.6	85.2	100.7	114.9
Rated heat input	Full load	kW	304.8	376.2	447.6	519.0	590.0
	Part load	kW	61.0	75.2	89.5	103.8	118.0
Net efficiency (NCV)		%	110	110	110	110	110
Seasonal efficiency (L2B)		%	96.4	96.8	96.7	97.0	96.8
Max flow temperature		°C	85				
Max working pressure		bar	6				
Safety temperature cut-out		°C	100				
Water content		l	47.3	53.3	59.3	65.3	75.3
Water flow resistance	ΔT 20k	mbar	99	105	95	108	113
	ΔT 11k	mbar	330	344	311	358	375
Flue gas temperature @ 50/30 °C	Full load	°C	45	44	44	43	44
	Part load	°C	30	30	30	30	30
Flue gas temperature @ 80/60 °C	Full load	°C	65	65	65	65	65
	Part load	°C	57	58	58	58	58
Flue gas mass flow rate	Full load	g/s	142.4	174.5	207.1	240.6	271.9
	Part load	g/s	28.7	36.8	40.6	48.0	53.2
CO ₂ content	Full load	%	9.1				
	Part load	%	9.3				
NO _x rating @ 0% oxygen, dry		mg/kWh	40				
Available flue pressure		Pa	100				
Sound emission level @1m	Full load	dB(A)	57.6	59.9	58.9	59.9	59.8
Electrical power consumption	Full load	W	395	449	487	588	734
	Part load	W	40	45	42	45	49
Power supply			230 VAC / 50 Hz				
Electrical ingress protection			IP X0D				
CE certification, product ID no.			CE0085BU0332				
Gas pressure – Natural Gas (G20)			17 - 25 mbar				
Gas rating – Natural Gas (G20)		m ³ /hr	32.3	39.8	47.4	55.0	62.5

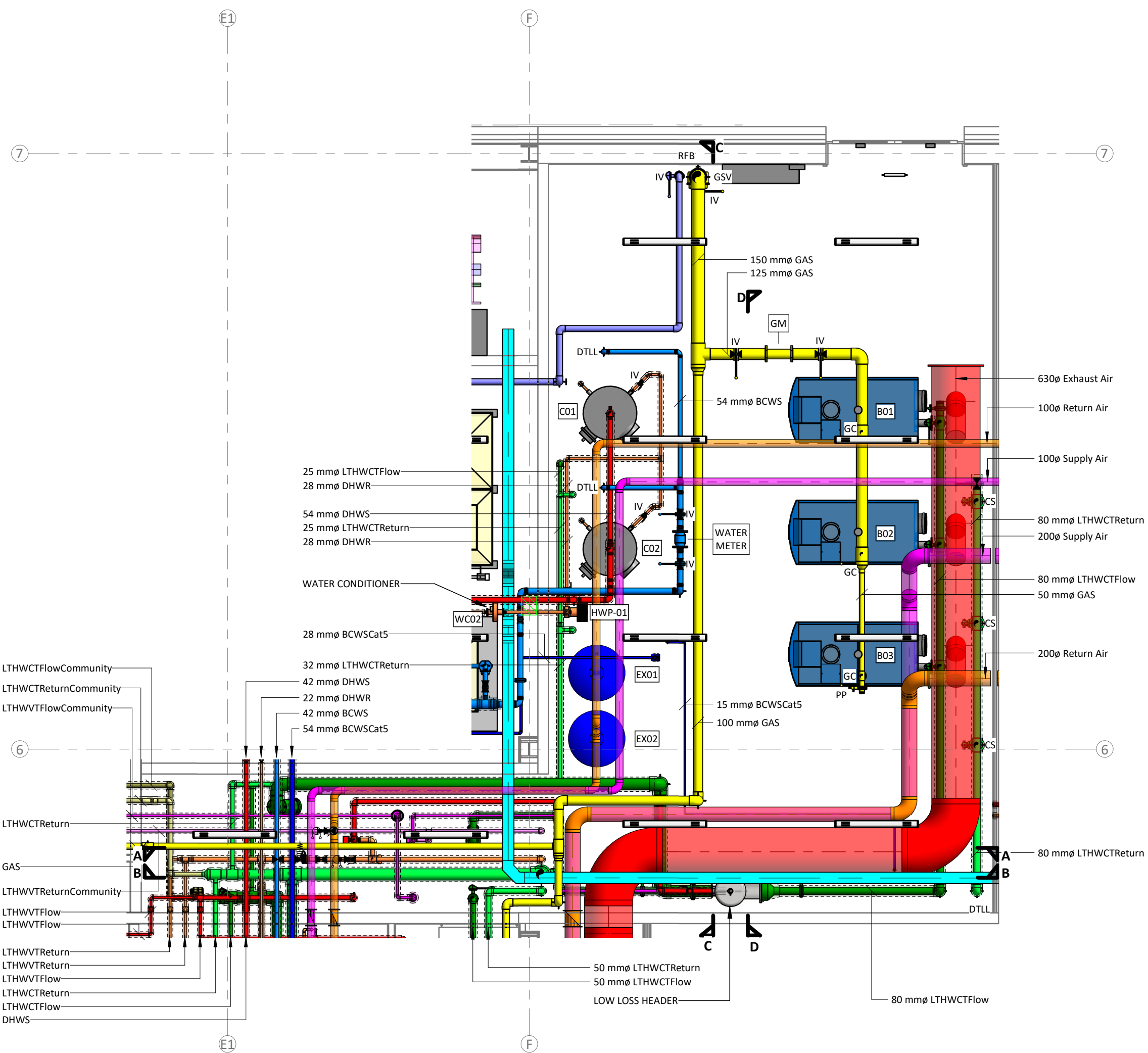
Water Quality

As with all high performance commercial condensing boilers with aluminium heat exchangers, it is important to fill and top up the system with water that does not contain a lot of calcium carbonate. In areas where the water hardness is described as moderately hard, hard or very hard (i.e. water hardness is above 10.6° English (Clarke) hardness or has a level of calcium carbonate above 50 mg/l) it is important that the water is treated. The information about local water hardness is readily available from the supplying water company or simple testing kits available. In cases where water treatment is required Buderus recommends the use of Sentinel X100. Failure to manage water hardness can reduce the performance of the boiler or cause boiler failure which is not covered by the guarantee.

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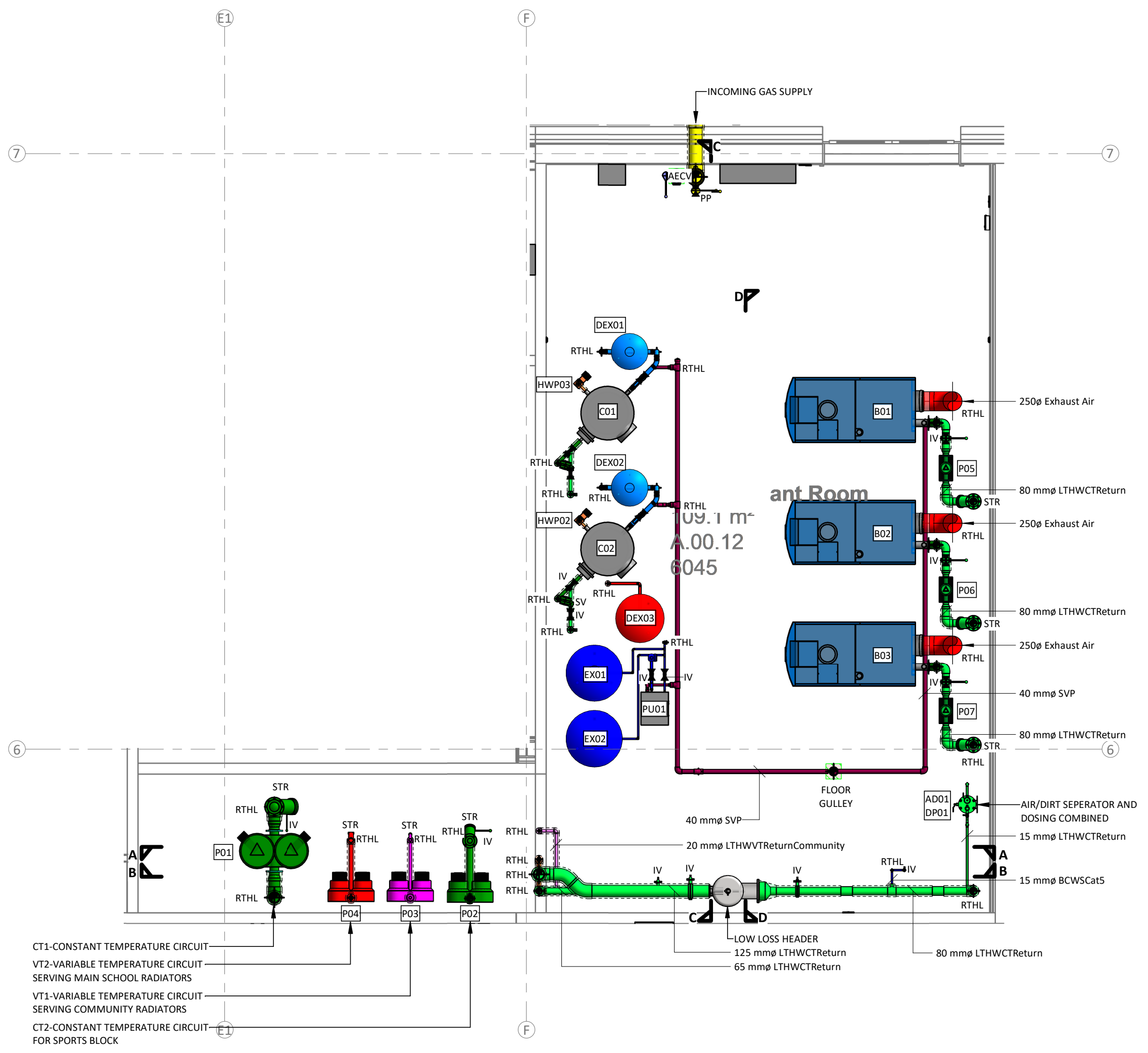
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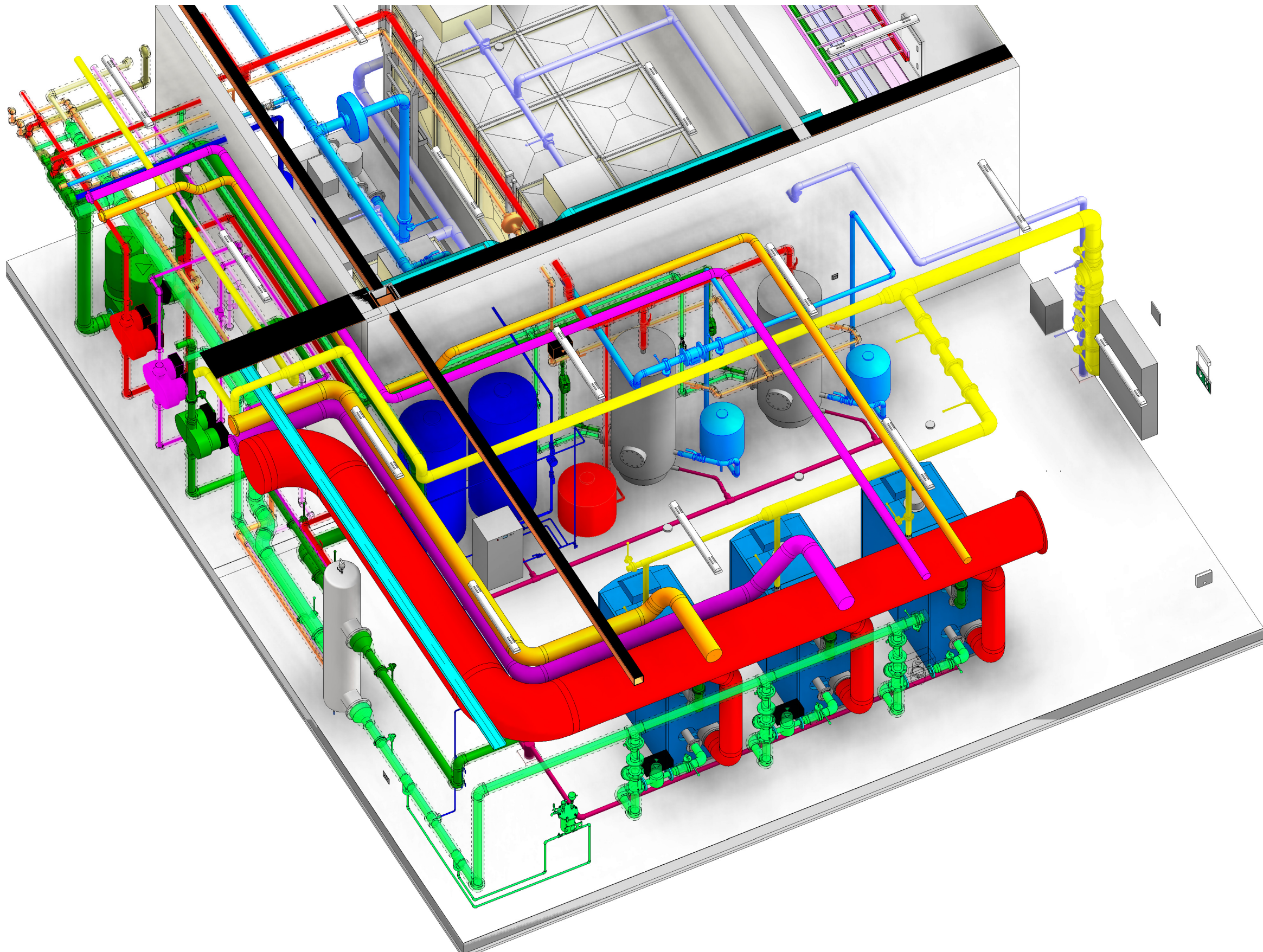
GF HEATING PLANT ROOM HIGH LEVEL

1:50



GF HEATING PLANT ROOM LOW LEVEL

1:50



GF HEATING PLANT ROOM 3D VIEW

N.T.S.

VENTILATION LEGEND:

	EXHAUST AIR
	FRESH AIR
	RETURN AIR
	SUPPLY AIR
	DUCTWORK ACOUSTICALLY WRAPPED
	FD FIRE DAMPER
	FSD FIRE AND SMOKE DAMPER
	ATTENUATOR
	CTA CROSS TALK ATTENUATOR
	VCD VOLUME CONTROL DAMPER
	BDS BACK DRAUGHT SHUTTER
	TG TRANSFER GRILLE
	UC DOOR UNDERCUT
	TA TO ABOVE
	FB FROM BELOW

HEATING & COOLING LEGEND:

	LTHW VT FLOW
	LTHW VT RETURN
	LTHW VT FLOW COMMUNITY
	LTHW VT RETURN COMMUNITY
	LTHW CT FLOW
	LTHW CT RETURN
	LTHW CT FLOW COMMUNITY
	LTHW CT RETURN COMMUNITY

	CS	COMMISSIONING SET
	DPCV	DIFFERENTIAL PRESSURE CONTROL VALVE
	DRV	DOUBLE REGULATING VALVE
	DC	DRAIN COCK
	IV	ISOLATION VALVE
	LSV	LOCK SHIELD VALVE
		ORIFICE PLATE
	PICV	PRESSURE INDEPENDENT CONTROL VALVE
	STR	STRAINER
	M3PV	THREE PORT MOTORISED VALVE
	TRV	THERMOSTATIC RADIATOR VALVE
	SV	SOLENOID VALVE
		REFRIGERANT LEAK DETECTOR

GAS LEGEND:

	GAS PIPEWORK
	GSOP GAS AND OTHER SERVICES ISOLATION PANEL
	AECV EMERGENCY CONTROL VALVE
	GC GAS COCK
	GSV GAS SOLENOID VALVE
	PP PURGE POINT
	L/L LOW LEVEL
	H/L HIGH LEVEL
	TA TO ABOVE
	FB FROM BELOW
	FA FROM ABOVE
	TB TO BELOW
	DTLL DROP TO LOW LEVEL
	RTHL RISE TO HIGH LEVEL

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION	
FOR DETAILS OF SITE-WIDE AND GENERAL RISKS, TO BE READ IN CONJUNCTION WITH THESE NOTES, SEE THE CONTRACT DOCUMENTS AND, WHERE WORKS ARE NOTIFIABLE, THE PRE-CONSTRUCTION INFORMATION	
IN ADDITION TO THE RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK, DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION:	
CONSTRUCTION	
CI.	No unusual risks identified. Refer to risk assessment.
DISMANTLING / DEMOLITION (FUTURE)	
DI.	No unusual risks identified. Refer to risk assessment.
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT	

WATER SERVICES NOTES:

- DO NOT SCALE THIS DRAWING. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S STRUCTURAL ENGINEERS AND M&E DRAWINGS AND THE M&E SPECIFICATION, SAMPLES SHEET AND ROOM DATA SHEETS.
- ALL ITEMS OF EQUIPMENT SHALL BE INSTALLED AS TO THE MANUFACTURER'S RECOMMENDATIONS.
- ALL INFORMATION AND LAYOUTS DETAILED ON THIS DRAWING ARE SUBJECT TO SITE DIMENSION CHECKS.

WATER SERVICES LEGEND:

	DOMESTIC HOT WATER SUPPLY
	DOMESTIC HOT WATER RETURN
	MAINS COLD WATER SUPPLY
	BOOSTED COLD WATER SUPPLY
	BOOSTED COLD WATER CATEGORY 5 SUPPLY
	EWH ELECTRIC WATER HEATER
	DTLL DROP TO LOW LEVEL
	L/L LOW LEVEL
	H/L HIGH LEVEL
	TA TO ABOVE
	FB FROM BELOW
	FA FROM ABOVE
	TB TO BELOW
	A 15Ø COLD WATER CONNECTION
	B 15Ø COLD & 15Ø HOT WATER CONNECTIONS
	C 3/4"Ø COLD WATER CONNECTION
	I ISOLATION VALVE
	SV SOLENOID VALVE

P05	12.08.21	TMH	BXP	BXP	Gas pipework amended.
P04	19.07.21	TMH	BXP	BXP	Layout updated
P03	17.12.20	TRG	BXP	BXP	Updates following CP Comments.
P02	12.11.20	TRG	BXP	AJB	Updated to suit new Gas.

Rev	Date	By	Chk	Aprvd	Description
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PROJECT
Harlington School Main Building
Hayes

CLIENT



www.methodllp.com Swindon Tel: 01793 822044

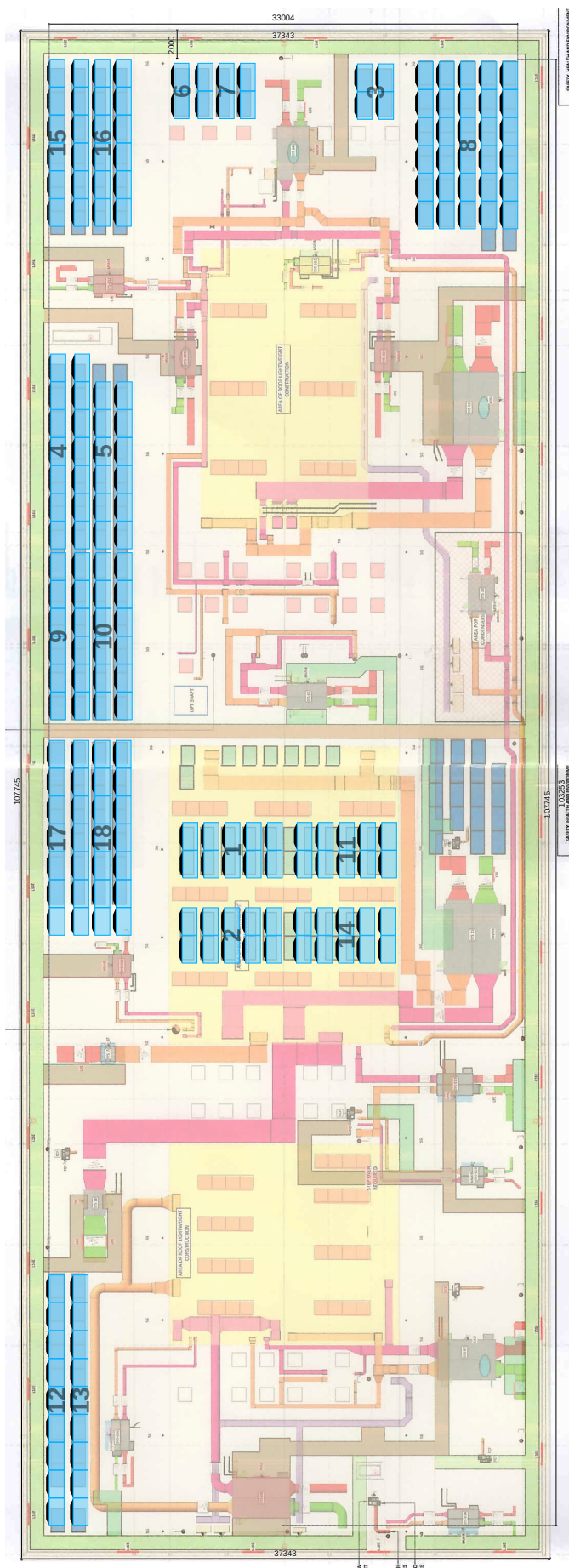
DRAWING TITLE
Heating Plant Room Layout

STATUS
S3 - FOR COMMENT

DATE	SCALE	DRWN BY	CHK BY	APVD BY
15.10.20	1:50 - A1	TRG	BXP	AJB

DRAWING NUMBER	REVISION NO.
102451-MET-A1-00-DR-M-9050	S3 - P05

Scaling Note: Do NOT scale from this drawing.





HiKu Mono

400 W ~ 425 W

CS3N-400 | 405 | 410 | 415 | 420 | 425MS

MORE POWER



Module power up to 425 W
Module efficiency up to 20.9 %



Lower LCOE & BOS cost



Comprehensive LID / LeTID mitigation
technology, up to 50% lower degradation



Better shading tolerance

*Black frame product can be provided upon request.



**Enhanced Product Warranty on Materials
and Workmanship***



Linear Power Performance Warranty*

**1st year power degradation no more than 2%
Subsequent annual power degradation no more than 0.55%**

*According to the applicable Canadian Solar Limited Warranty Statement.

MORE RELIABLE



Minimizes micro-crack impacts



Heavy snow load up to 5400 Pa,
enhanced wind load up to 2400 Pa*

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001: 2015 / Quality management system
ISO 14001: 2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

* For detailed information, please refer to the Installation Manual.

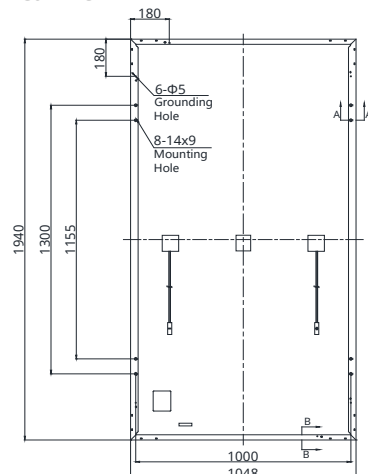
CANADIAN SOLAR INC.

545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

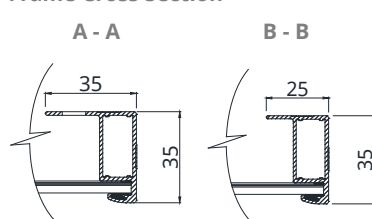
CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. Canadian Solar was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey, and is a leading PV project developer and manufacturer of solar modules, with over 46 GW deployed around the world since 2001.

ENGINEERING DRAWING (mm)

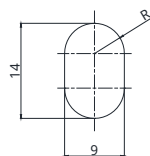
Rear View



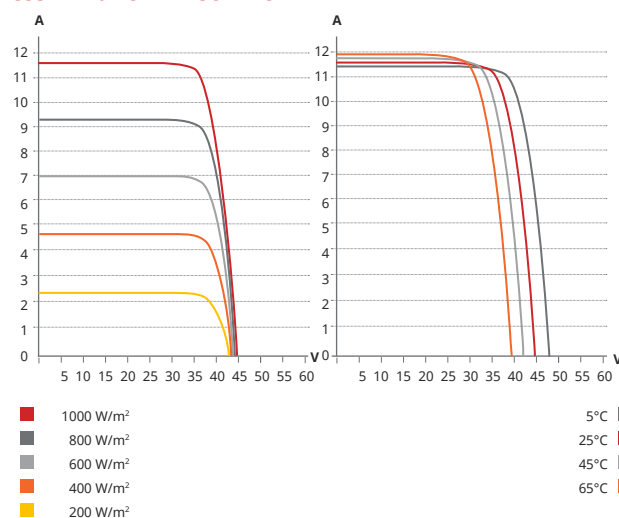
Frame Cross Section



Mounting Hole



CS3N-410MS / I-V CURVES



ELECTRICAL DATA | STC*

CS3N	400MS	405MS	410MS	415MS	420MS	425MS
Nominal Max. Power (Pmax)	400 W	405 W	410 W	415 W	420 W	425 W
Opt. Operating Voltage (Vmp)	37.2 V	37.4 V	37.6 V	37.8 V	38.0 V	38.2 V
Opt. Operating Current (Imp)	10.76 A	10.83 A	10.92 A	10.98 A	11.06 A	11.13 A
Open Circuit Voltage (Voc)	44.5 V	44.7 V	44.9 V	45.1 V	45.3 V	45.5 V
Short Circuit Current (Isc)	11.50 A	11.56 A	11.62 A	11.68 A	11.74 A	11.80 A
Module Efficiency	19.7%	19.9%	20.2%	20.4%	20.7%	20.9%
Operating Temperature	-40°C ~ +85°C					
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)					
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)					
Max. Series Fuse Rating	20 A					
Application Classification	Class A					
Power Tolerance	0 ~ + 10 W					

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	132 [2 X (11 X 6)]
Dimensions	1940 X 1048 X 35 mm (76.4 X 41.3 X 1.38 in)
Weight	22.5 kg (49.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-); landscape: 1250 mm (49.2 in)*
Connector	T4 series or H4 UTX or MC4-EVO2
Per Pallet	30 pieces
Per Container (40' HQ)	720 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

ELECTRICAL DATA | NMOT*

CS3N	400MS	405MS	410MS	415MS	420MS	425MS
Nominal Max. Power (Pmax)	298 W	302 W	306 W	310 W	313 W	317 W
Opt. Operating Voltage (Vmp)	34.7 V	34.9 V	35.1 V	35.2 V	35.4 V	35.6 V
Opt. Operating Current (Imp)	8.60 A	8.66 A	8.72 A	8.81 A	8.85 A	8.91 A
Open Circuit Voltage (Voc)	41.9 V	42.1 V	42.2 V	42.4 V	42.6 V	42.8 V
Short Circuit Current (Isc)	9.28 A	9.33 A	9.38 A	9.42 A	9.47 A	9.52 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m²-spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.35 % / °C
Temperature Coefficient (Voc)	-0.27 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Canadian Solar Inc. reserves the right to make necessary adjustment to the information described herein at any time without further notice.

Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

PARTNER SECTION



CANADIAN SOLAR INC.

545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com