MECHANICAL DATA SHEET FOR COMBUSTION AIR PREHEATER (10-E-2005)

D2	20-Sep-2023	Final Issue	E.F.	S.CH.	G.D.I
D1	22-May-2023	Issued for Approval	M.V.	A.H.	M.B.
D0	17-Mar-2023	Issued for Comment	M.V.	A.H.	S.CH
Rev.	**Issue Date**	**Purpose of Issue**	**Prepared**	**Checked**	**Approved**

شرکت طرح و ساخت پیشا (مجری طرحهای صنایع نفت، گاز، پتروشیمی و نیرو) استنبو Shanfari پرگاسیران PARGASIRAN RIZZI	**Eslam Abad Gharb(NPC)** **Gas To Methanol and PVM Complex**	شرکت ملی صنایع پتروشیمی Shargan Consultant Engineers

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Page	MECHANICAL DATASHEET FOR COMBUSTION AIR PREHEATER	Rev.	Class
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1	SERVICE: STEAM REFORMER ITEM 10-H-2001			LOCATION:	ESLAM ABAD GHARB - IRAN		
2	**GENERAL DATA**						
3	EQUIPMENT:	FLUE GAS / C.A. PREHEATERS		HEAT. SURF. MATERIAL:	CARBON STEEL DC04		
4	EQUIPMENT NR. / ITEM	2 IDENTICAL / 10-E-2005 A & B		CASING MATERIAL:	EN10025 S275 JR		
5	WEIGHT: (kg)	~ 94000 each					
6	DIMENSIONS: (WxLxH) mm	8430 x 8069 x 5511					
7	**PERFORMANCE DATA**						
8	OPERATING CASE			DESIGN CASE	HOT AMBIENT AIR		
9	**AIR SIDE**						
10	FLOW ENTERING APH		kg/hr	212950	212950		
11	INLET TEMPERATURE		°C	15.6	40		
12	OUTLET TEMPERATURE		°C	335	340		
13	PRESSURE DROP:	ALLOWABLE	mmH2O	150	150		
14		CALCULATED	mmH2O	144	148		
15	MOLECULAR WEIGHT:		kg/kmol	28.66			
16	DENSITY:	INLET / OUTLET	kg/m3	1.09 / 0.508			
17	VISCOSITY:	INLET / OUTLET	cP	0.018 / 0.031			
18	SPECIFIC HEAT CAPACITY:	INLET / OUTLET	kJ/kg/°C	1.019 / 1.086			
19	FOULING RESISTANCE:		m^2 °C/W	0.0002			
20	THERMAL CONDUCTIVITY:	INLET / OUTLET	W/m/°C	0.0268 / 0.0345			
21	AIR BY-PASS, kg/h			0	0		
22	TOTAL AIR FLOW TO BURNERS, kg/h			425900	425900		
23	MIX AIR OUTLET TEMPERATURE, °C			335	340		
24	HEAT ABSORBED:		MW	19.9	18.8		
25	**FLUE GAS SIDE**						
26	FLOW		kg/hr	225900	225900		
27	INTLET TEMPERATURE		°C	410	410		
28	OUTLET TEMPERATURE		°C	153.4	169		
29	PRESSURE DROP:	ALLOWABLE	mmH2O	150	150		
30		CALCULATED	mmH2O	148	147		
31	MOLECULAR WEIGHT:		kg/kmol	26.26			
32	DENSITY:	INLET / OUTLET	kg/m3	0.387 / 0.609			
33	VISCOSITY:	INLET / OUTLET	cP	0.029 / 0.020			
34	SPECIFIC HEAT CAPACITY:	INLET / OUTLET	kJ/kg/°C	1.279 / 1.205			
35	FOULING RESISTANCE:		m^2 °C/W	0.00017			
36	THERMAL CONDUCTIVITY:	INLET / OUTLET	W/m/°C	0.0378 / 0.0313			
37	FLUE GAS COMPOSITION, MOLE %						
38		Oxygen		1.71	1.71		
39		Nitrogen		68.06	68.06		
40		Water		25.58	25.58		
41		Carbon dioxide		4.65	4.65		
42		Argon					
43	DEW POINT TEMP, °C			101	101		
44	MINIMUM METAL TEMP, °C	ALLOWABLE	°C	110	110		
45		CALCULATED	°C	111	140		
46	**MISCELLANEOUS:**						
47	MINIMUM AMBIENT AIR TEMPERATURE		°C	-23			
48	SITE ELEVATION ABOVE SEA LEVEL, m		m	1350			
49	RELATIVE HUMIDITY		%	85			
50	EXTERNAL COLD AIR BY-PASS (YES/NO)			Yes (See note 1 in next page)			
51	COLD END THERMOCOUPLES (YES/NO) / NUMBER REQ.			Yes / N° 2 Thermocouples, suitable for Zone 2 IIC T3			
52	ACCESS DOORS: NUMBER / SIZE / LOCATION			2 IN AIR TURN DUCTS 800x800 & 2 IN INTERCONNECTING GAS DUCT 1200 x 600 mm			
53	INSULATION (INTERNAL/EXTERNAL)			EXTERNAL			
54	CLEANING MEDIUM:	STEAM OR WATER		N/A			
55		PRESSURE	bar.g	N/A			
56		TEMP	° C	N/A			

1	SERVICE: STEAM REFORMER ITEM 10-H-2001		LOCATION: ESLAM ABAD GHARB - IRAN	rev
2				
3	I. CAST IRON:			
4	NUMBER OF PASSES		NA	
5	NUMBER OF TUBES PER BLOCK		NA	
6	NUMBER OF BLOCKS		NA	
7	TYPE OF SURFACE		NA	
8	TUBE MATERIAL		NA	
9	TUBE OF THICKNESS, mm		NA	
10	GLASS BLOCK (YES/NO)		NA	
11	NUMBER OF GLASS TUBES		NA	
18	II. PLATE TYPE:			
19	NUMBER OF PASSES		2	
20	NUMBER OF PLATES PER ROW		181+162	
21	NUMBER OF ROWS		10	
22	PLATE THICKNESS Minimum, mm		1.5	
23	WIDTH OF AIR CHANNEL, mm		25+20	
24	WIDTH OF FLUE GAS CHANNEL, mm		20+30	
25	AIR SIDE RIB PITCH, mm		NA	
26	FLUE GAS SIDE RIB PITCH, mm		NA	
27	MATERIAL: PLATE		CARBON STEEL DC04	
28	RIB FINS		NA	
29	FRAME		EN10025 S275 JR	
30	BOLTED/WELDED		WELDED/BOLTED	
31	BOLTED/WELDED		WELDED/BOLTED	
32	SUPPLIED WITH CLIPS		YES	
33	WATER WASH: YES/NO		NO	
34	TYPE (OFF-LINE OR ON-LINE)		NA	
35	LOCATION		NA	
36	**MECHANICAL DESIGN:**			
37	DESIGN TEMPERATURE (FLUE GAS / AIR)	°C	450/400	
38	DESIGN PRESSURE	mmH2O	-250/932 (FLUE GAS SIDE); 932 (COMBUSTION AIR SIDE)	
39	TEST PRESSURE	mmH2O	100	
40	SEISMIC FACTOR		As per project specification "GTP-DE-00-00-ST-EDC-40000"	
41	PAINTING REQUIREMENTS		As per project specification	
42	LEAK TEST		YES BUBBLE TEST	
43	STRUCTURAL WIND LOAD, kg / m²		As per project specification "GTP-DE-00-00-ST-EDC-40000"	
44	AIR LEAKAGE (MAX), %		< 0.5% of Normal flow	
45				
46	NOTES:			
47	1. Air by-pass provided for flue gas temperature control purpose (i.e., to raise temperature in case of air too cold).			
48	Normally, no flow in the by-pass.			
49	2. When ambient temperature is lower than 15.6 °C, steam air preheater tag 10-E-2005-II shall heat up the air to 15.6 °C.			
50	3. The mechanical design and tightness for the exchanger are guaranteed for 120% of normal flow of both flue gas and			
51	combustion air.			
52	4. Air side/flue gas side design pressure will be finalized based on information from FD/ID fan vendor.			
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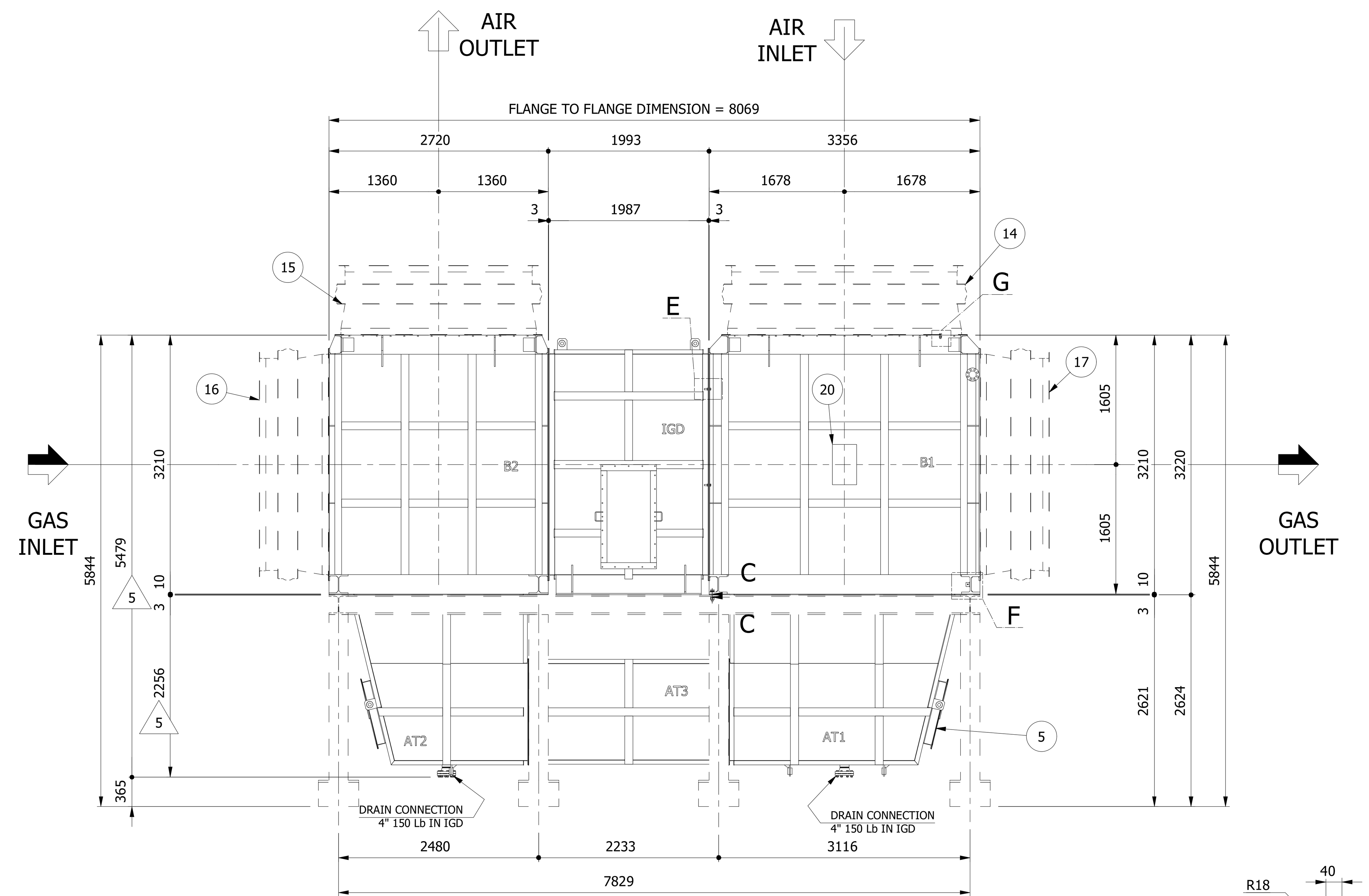
DATA SHEET as per API 560

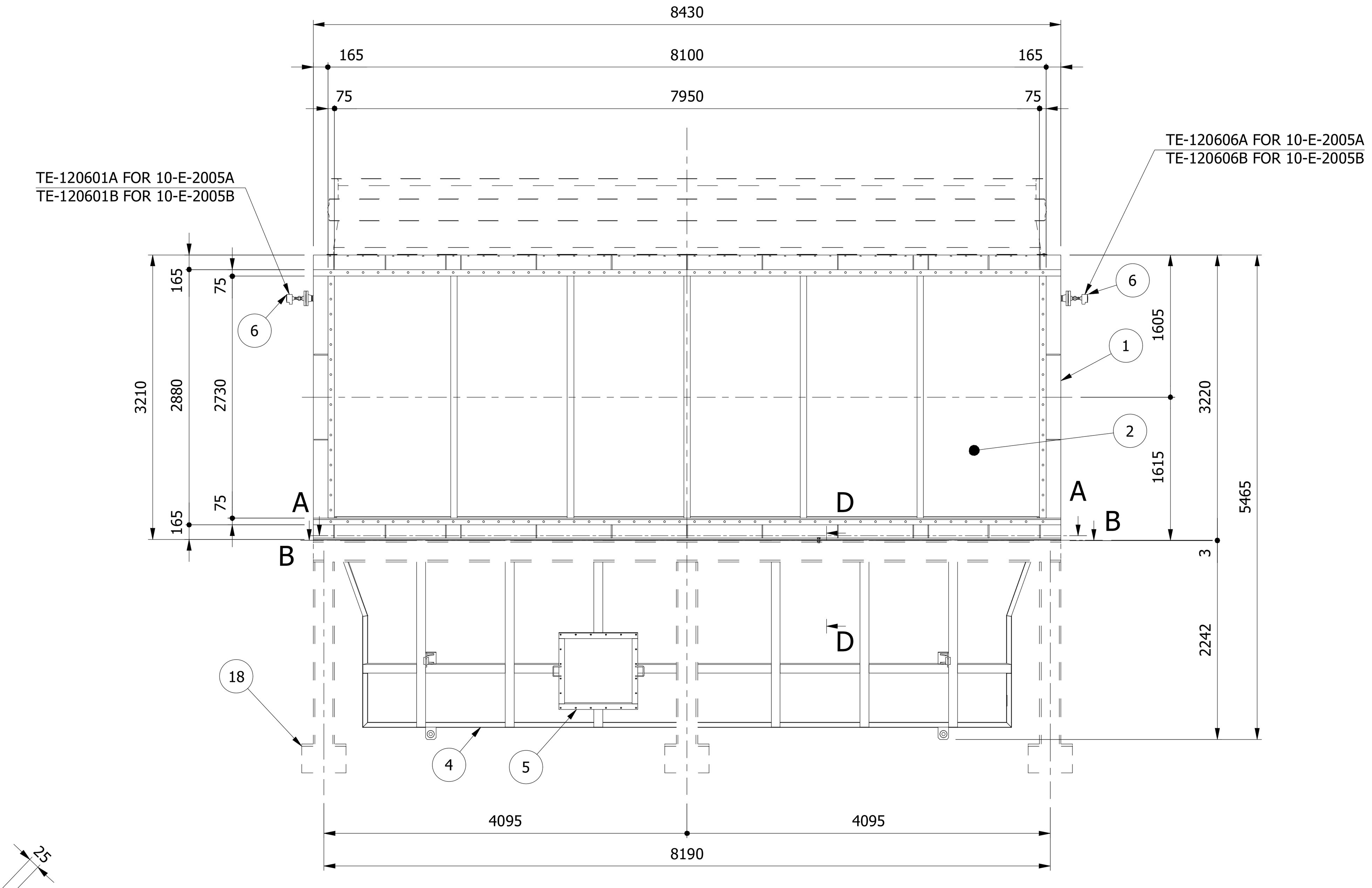
date 15/05/2023 Issued

Checked

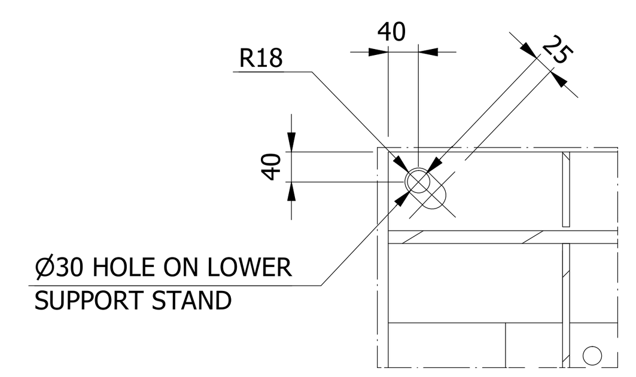
rev 5 Approved



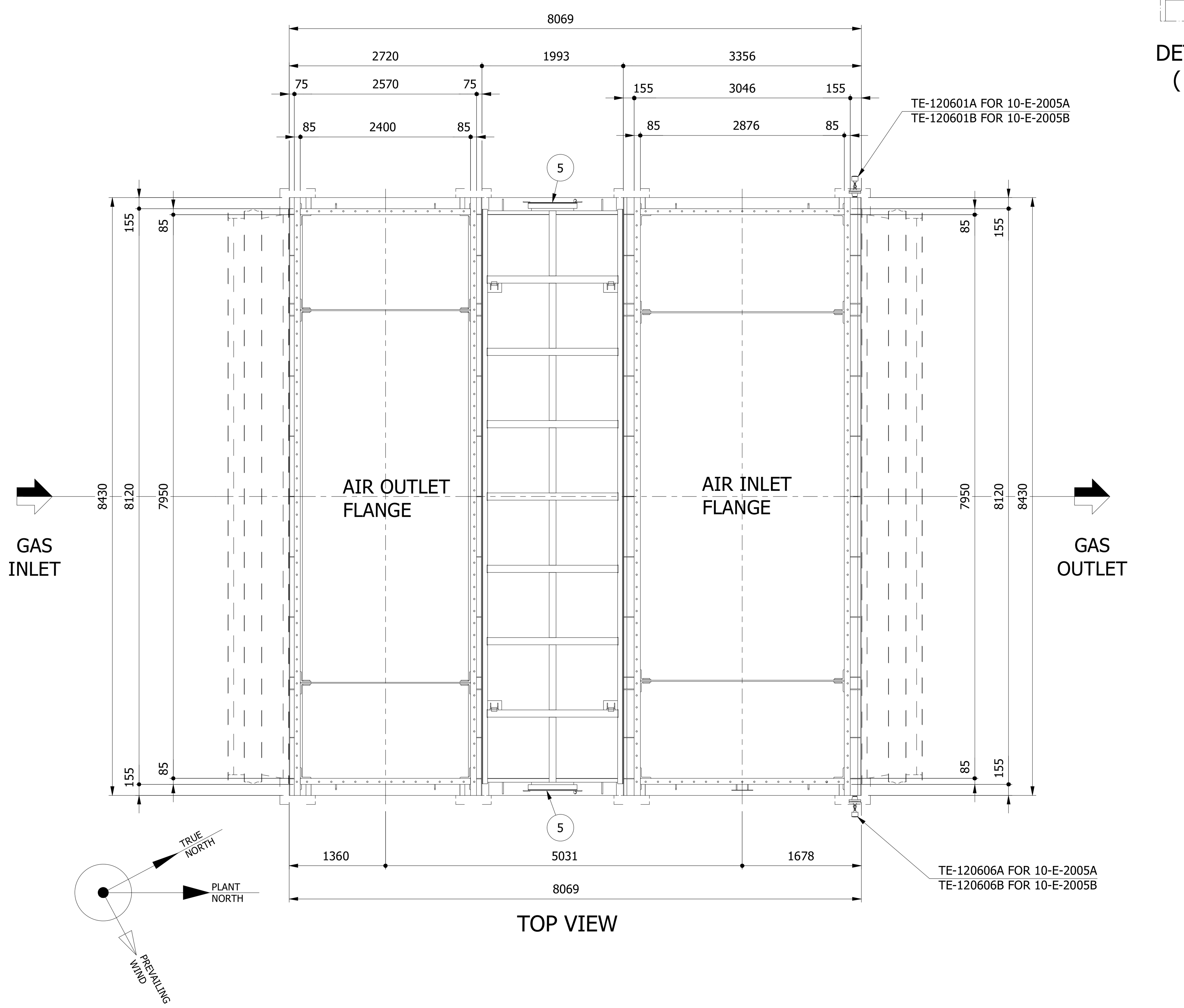
FRONT VIEW



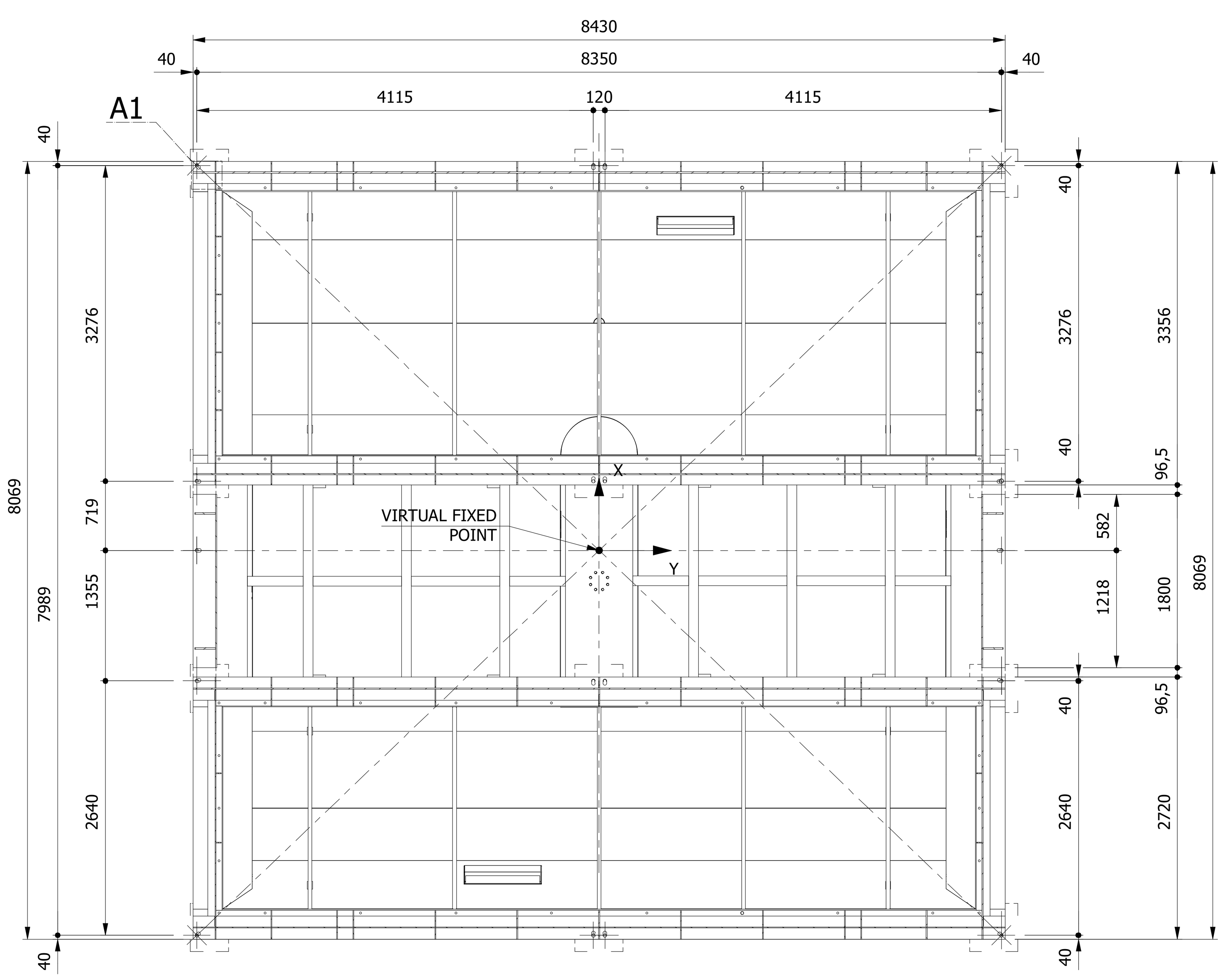
GAS INLET SIDE



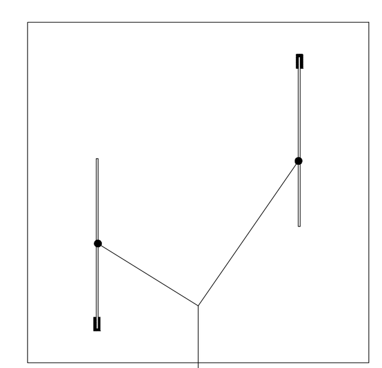
DETAIL "A1"
(1 : 10)



TOP VIEW

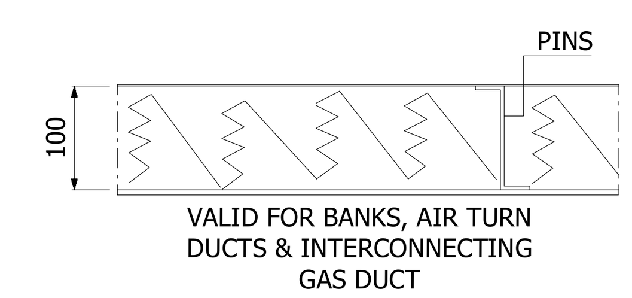


SECTION "A-A"
SLOTTED HOLE DETAIL



PINS Ø3 mm ALREADY WELDED ONTO STEEL CASING

TYPICAL PINS ARRANGEMENT BETWEEN CASING STIFFENERS



VALID FOR BANKS, AIR TURN DUCTS & INTERCONNECTING GAS DUCT

DETAIL "Z" - EXTERNAL THERMAL INSULATION PROCEDURE DONE BY OTHERS

A. PUT ALL THE PINS IN VERTICAL POSITION
B. MOUNT THE COVERING SHEET SUPPORTS
C. INSERT MINERAL WOOL PANELS ONTO PINS
D. BEND THE TIP OF THE PINS
E. PLACE & FIX THE COVERING SHEETS ONTO THE SUPPORTS USING RIVETS

TEST DATA

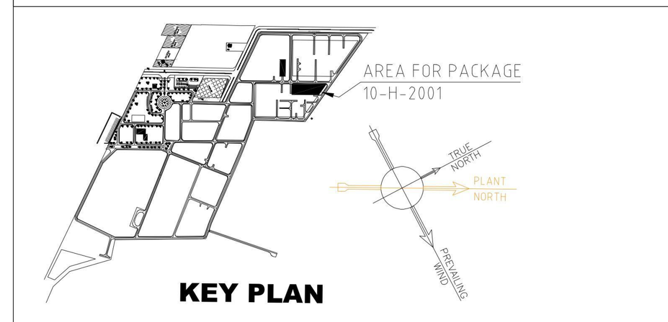
RULES & CODES		RIZZI STANDARDS
TESTING		RIZZI QUALITY ASSURANCE SERVICE

PLANT REFERENCE

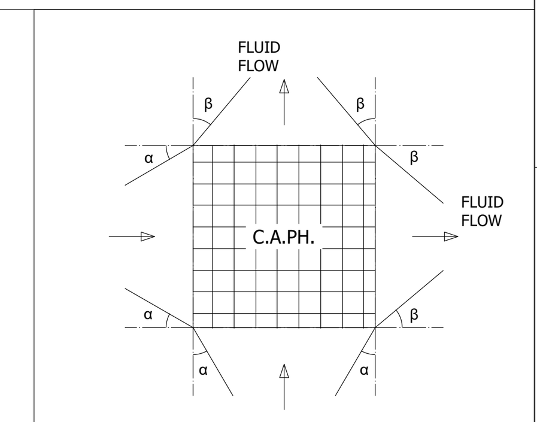
CUSTOMER		SHANFARI GMBH
OWNER		NATIONAL PETROCHEMICAL COMPANY (NPC)
PLANT LOCATION		ESLAM ABAD GHARB - IRAN
AT SERVICE OF		STEAM REFORMER ITEM 10-H-2001
EQUIPMENT QUANTITY	No.	2
EQUIPMENT ITEM	No.	10-E-2005 A & 10-E-2005 B
EQUIPMENT WEIGHT	kg.	94000 Each
RIZZI WORKSHOP NUMBER	No.	6483 / 6484

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. SUPPORT STAND BEAMS, COLUMNS, FOUNDATIONS AND BASE PLATE ARE INDICATIVE ONLY AND SHALL BE SIZED BY OTHERS.
3. FOR APH LOAD FOR FOUNDATION (DEAD LOAD, FLUID LOAD, WIND LOAD & SEISMIC LOAD) SEE "ENG 6483 - LOD".
4. EQUIPMENT WEIGHT DOES NOT INCLUDE WEIGHT OF AIR INLET/OUTLET, GAS INLET /OUTLET HOODS, LOWER SUPPORT STAND AND EXTERNAL INSULATION
5. REQUIRED FLOW GRADIENTS FOR HEAT EXCHANGER ENTRIES (AIR AND GAS) ARE:
   - FOR TEMPERATURE -5/+10°C
   - FOR FLOWS VELOCITIES -5/10%.
6. THE DESIGN IS VALID FOR BOTH 10-E-2005 A & 10-E-2005 B WHICH ARE IDENTICAL.



KEY PLAN



ALLOWED ANGLES:
α ≤ 30° FOR INLET HOOD
β ≤ 40° FOR OUTLET HOOD

POS.	DESCRIPTION	MATERIAL	QTY	SUPPLY
20	RIZZI RATING PLATE & LOGO	---	1	RIZZI
19	TACKING BOLT M20 x 50 WITH NUT	8.8 GALVANIZED	52	RIZZI
18	LOWER SUPPORT STAND	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
17	GAS OUTLET HOOD	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
16	GAS INLET HOOD	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
15	AIR OUTLET HOOD	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
14	AIR INLET HOOD	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
13	GASKET 70 x 5 FOR HOODS	GLASS FIBER	90m	SHANFARI (PARGASIRAN)
12	BOLT M16x50 WITH NUT & INCLINED WASHER FOR AIR & GAS INLET/OUTLET HOODS	8.8 GALVANIZED	512	SHANFARI (PARGASIRAN)
11	SLIDING PLATES	AISI 304	--	SHANFARI (PARGASIRAN)
10	BOLT M16x50 WITH NUT FOR IGD & AT1,2,3 & 4	8.8 GALVANIZED	472	RIZZI
9	GASKET 70x5 FOR IGD & AT1,2,3 & 4	GLASS FIBER	84m	RIZZI
8	BOLT M27x120 + 2 Nos. NUTS & 2 Nos. WASHERS	8.8 GALVANIZED	18	RIZZI
7	SPACER RING Ø33.4; H= 45mm	AISI 304	18	RIZZI
6	THERMOCOUPLE Ex i IIC T3; FLANGED 2" 300 Lb IN AISI 316	---	2	RIZZI
5	INSPECTION DOORS	EN 10025 S275 JR	4	SHANFARI (PARGASIRAN)
4	AIR TURN DUCTS AT1,2,3 & 4	EN 10025 S275 JR	4	SHANFARI (PARGASIRAN)
3	INTERCONNECTING GAS DUCT IGD	EN 10025 S275 JR	1	SHANFARI (PARGASIRAN)
2	HEAT TRANSFER MODULES OF BANK B1 & B2	CARBON STEEL DC04	2	RIZZI
1	BANKS STEEL FRAMES & CASINGS	EN 10025 S275 JR	2	SHANFARI (PARGASIRAN)

Rev.	Date	Status	Description	Issued by	Chkd by	Appd by	Client
D5	11/07/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
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D3	16/03/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
D2	10/03/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
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Client's MC: Shargan Consultant Engineers

Client: N.P.C.

Vendor: RIZZI ENGINEERING

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Eslam Abad Gharb (NPC)
Gas To Methanol and PVM Complex

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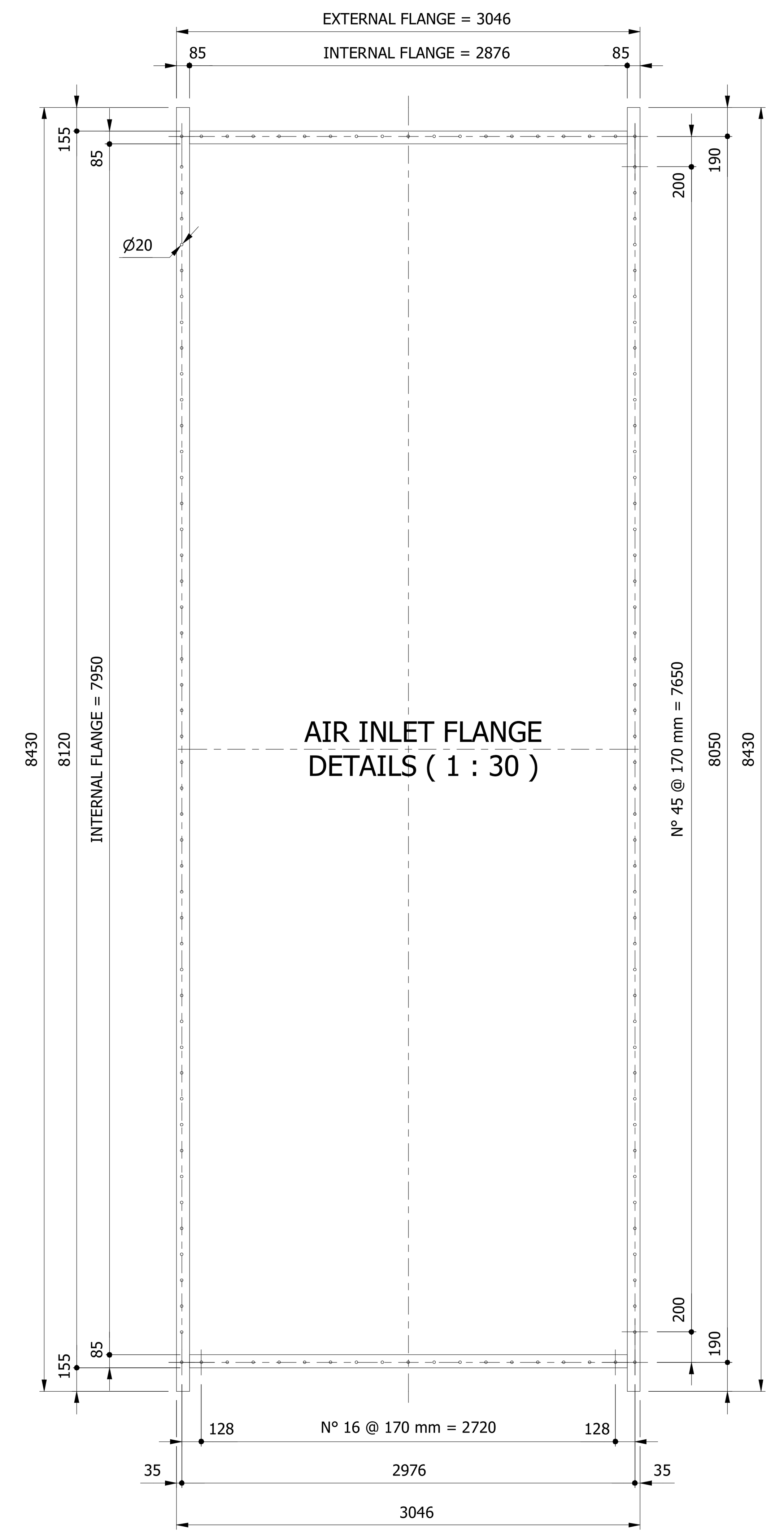
Document Title :
GENERAL ARRANGEMENT AND DETAIL DRAWING FOR APH FOR STEAM REFORMER PACKAGE (10-H-2001)

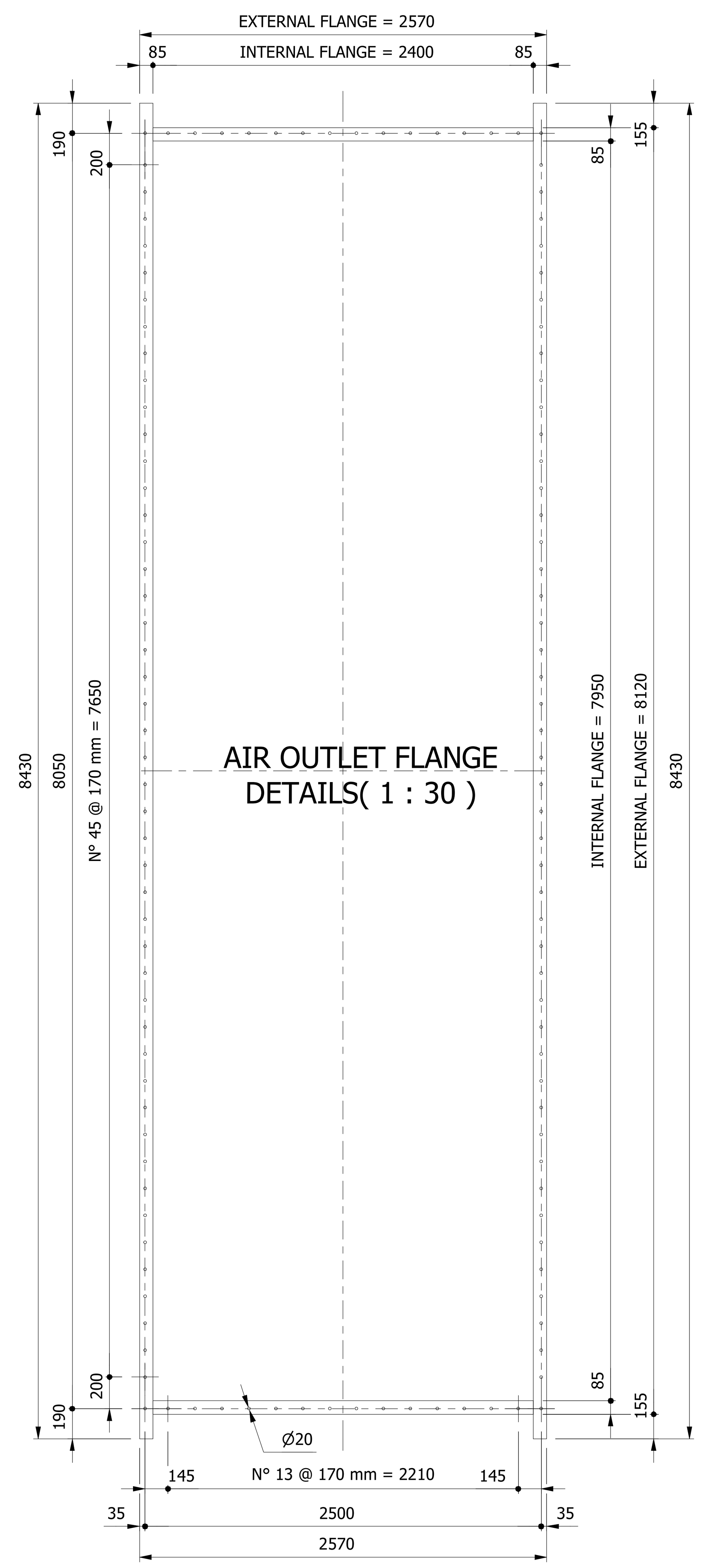
Document Class :	Document Type :	Scale	Size	Sheet
A	DWG	1:50	A1	1 OF 2

Document Number: P1003-RIZ-2321-DWG-001

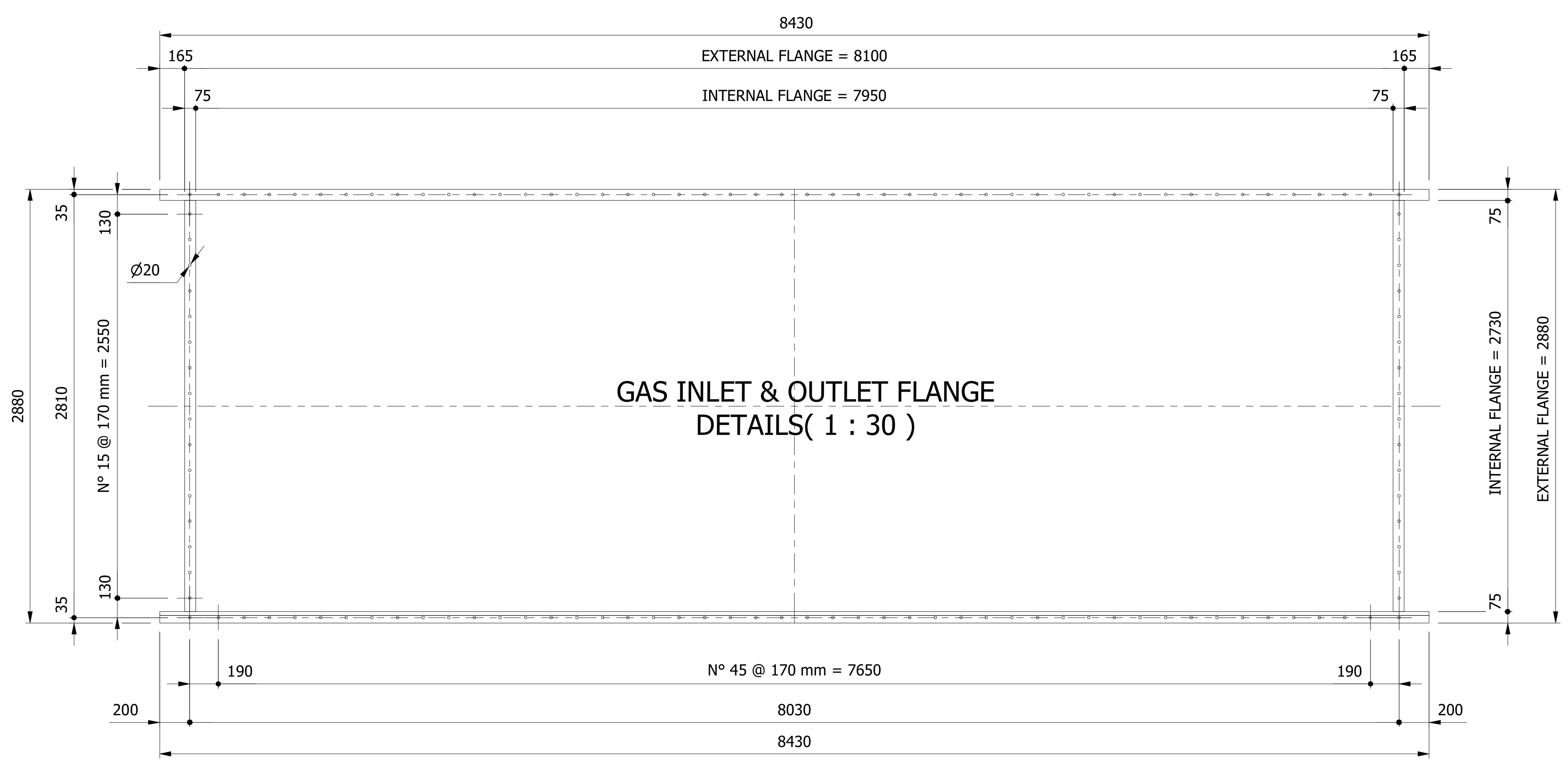
Rev. D5



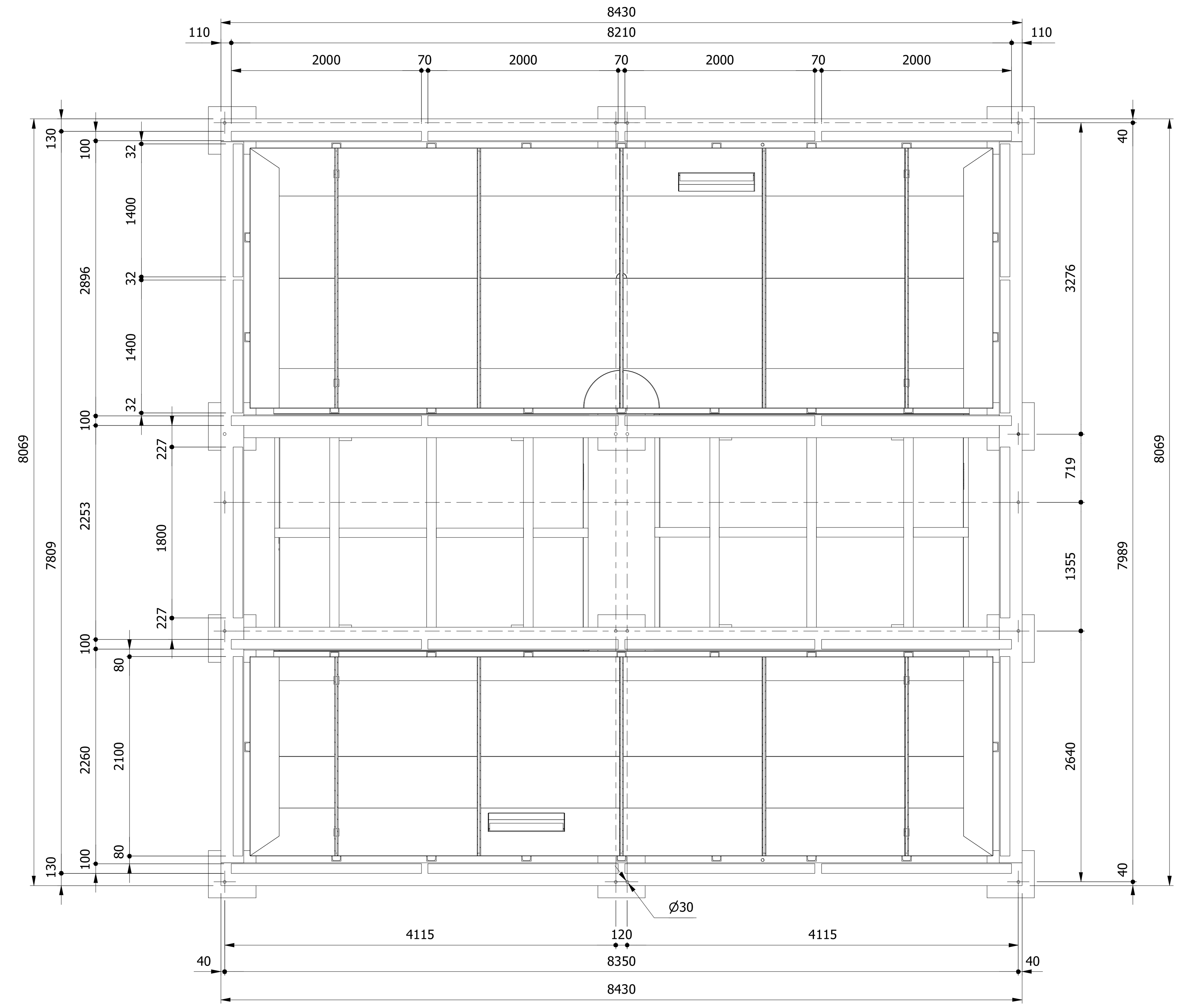
AIR INLET FLANGE DETAILS (1 : 30)



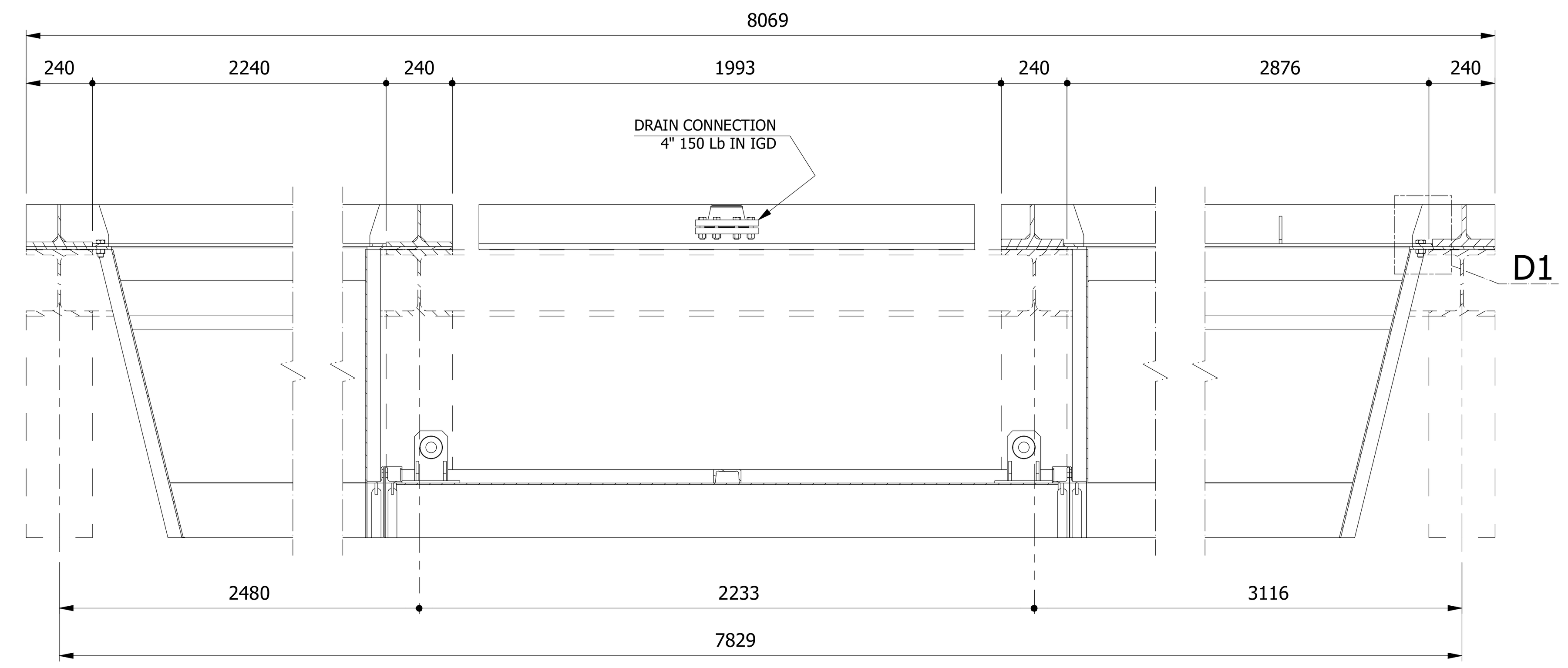
AIR OUTLET FLANGE DETAILS(1 : 30)



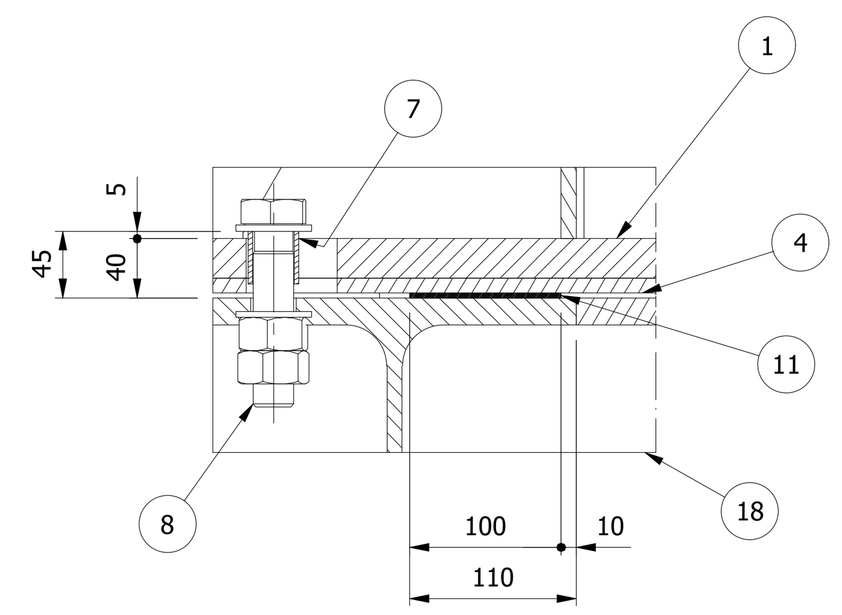
GAS INLET & OUTLET FLANGE DETAILS(1 : 30)



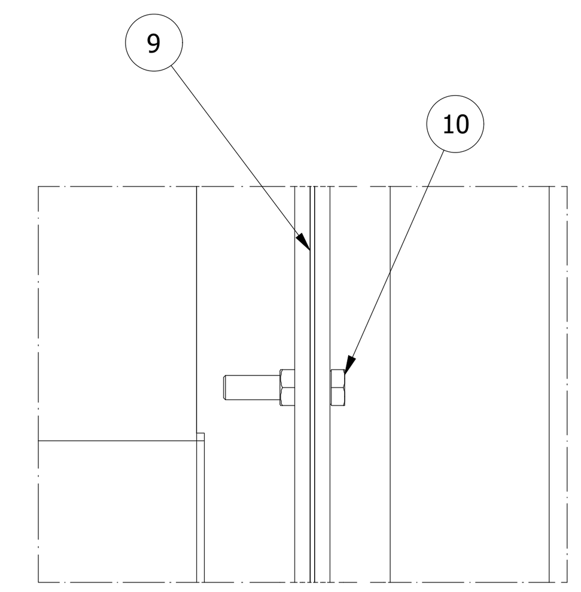
SECTION "B-B"
SLIDING PLATES & HOLES DETAIL ON LOWER SUPPORT STAND
(1 : 40)



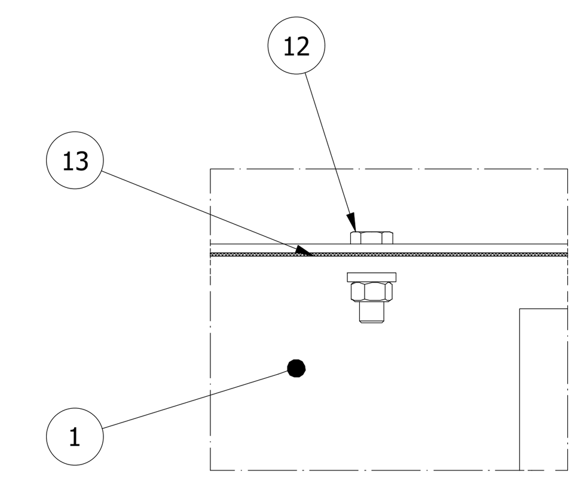
SECTION "D-D"
(1 : 20)



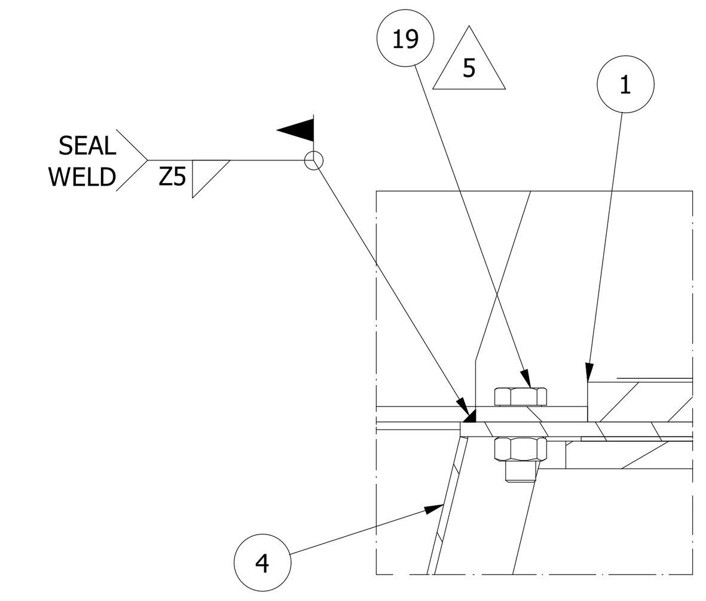
SECTION "C-C"
TYPICAL FIXING DETAIL ONTO LOWER SUPPORT STAND
(1 : 5)



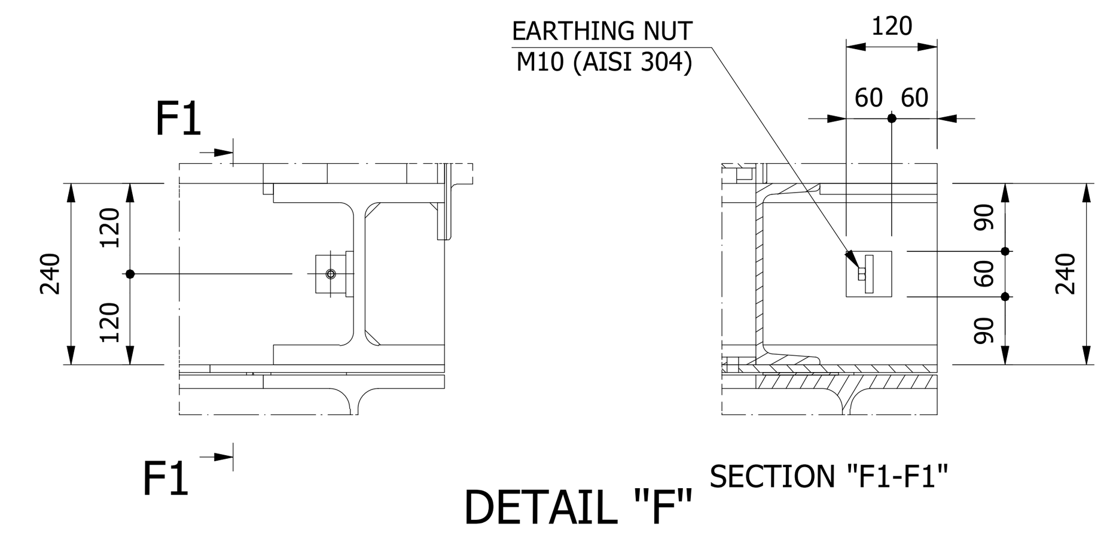
DETAIL "E"
TYPICAL BOLTING DETAIL BETWEEN BANKS B1& B2 AND INTERCONNECTING GAS DUCT IGD
TYPICAL BOLTING DETAIL BETWEEN AIR TURN DUCTS AT1 & AT2 AND AT3 & AT4
(1 : 5)



DETAIL "G"
TYPICAL BOLTING BETWEEN BANKS & AIR INLET/OUTLET HOODS
(1 : 5)



DETAIL "D1"
TYPICAL SEAL WELDING DETAIL BETWEEN BANK B1 & AIR TURN DUCT AT1
TYPICAL SEAL WELDING DETAIL BETWEEN BANK B2 & AIR TURN DUCT AT2
(1 : 5)



DETAIL "F"
EARTH BOSS DETAIL
N° 2 EARTH LOCATED DIAGONALLY OPPOSITE
(1 : 10)

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D5	11/07/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
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D3	16/03/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
D2	10/03/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
D1	10/02/2023	--	REVISED	M.V.	A.H.	I.R.	A.AGH
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Client's MC: Shargan Consultant Engineers

Client: N.P.C.

Vendor: RIZZI ENGINEERING

Contractor: اسنیتو

شرکت طرح و ساخت بینا
(مجری طرح‌های صنایع نفت، گاز، پتروشیمی و نیرو)

Project name:
Eslam Abad Gharb (NPC)
Gas To Methanol and PVM Complex

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Document Title :
GENERAL ARRANGEMENT AND DETAIL DRAWING FOR
APH FOR STEAM REFORMER PACKAGE (10-H-2001)

Document Class :	Document Type :	Scale	Size	Sheet
A	DWG	1:50	A1	2 OF 2

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