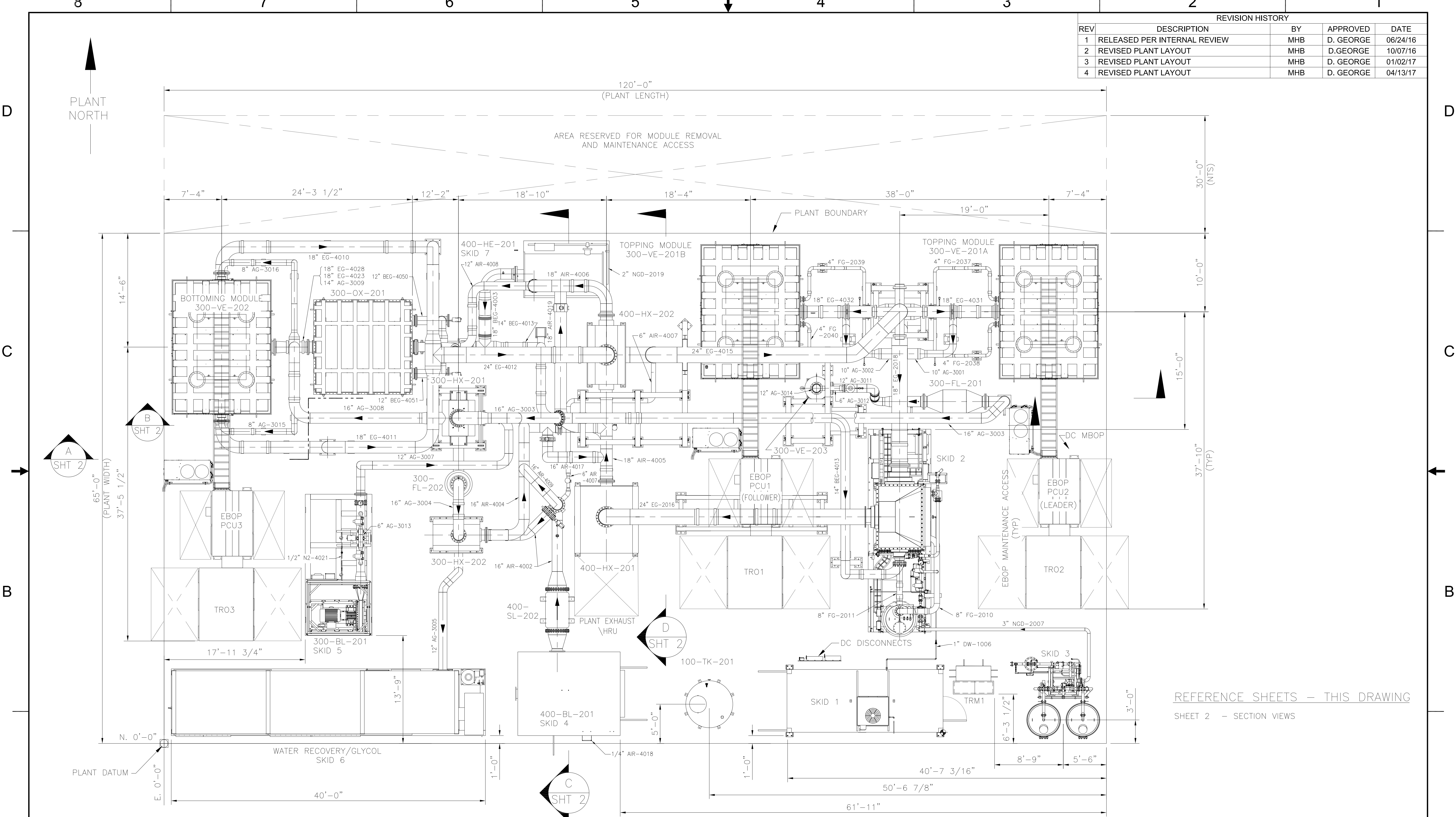
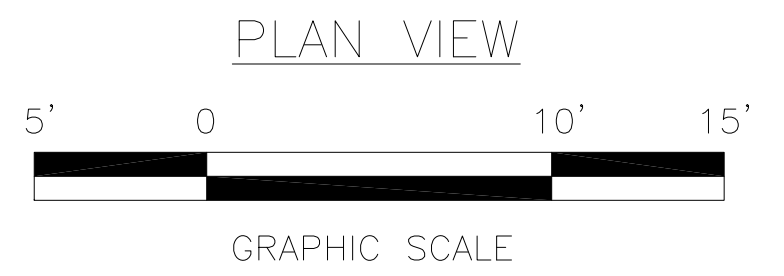


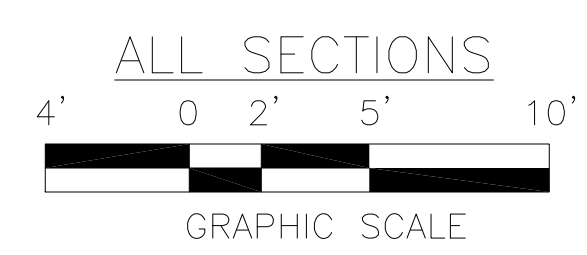
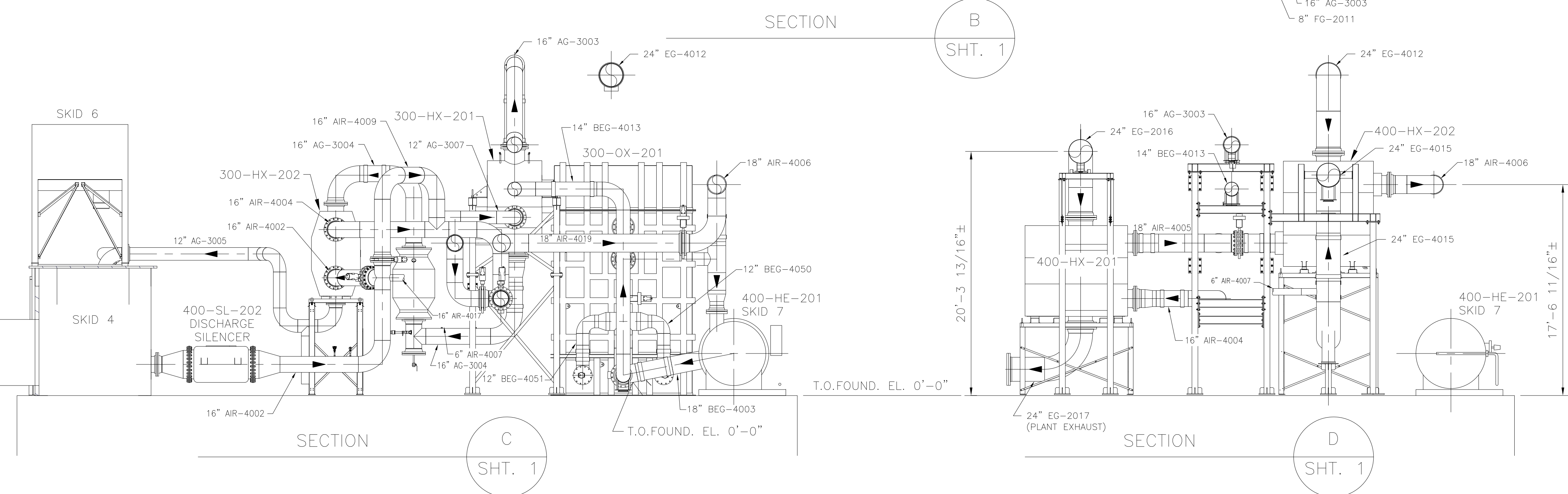
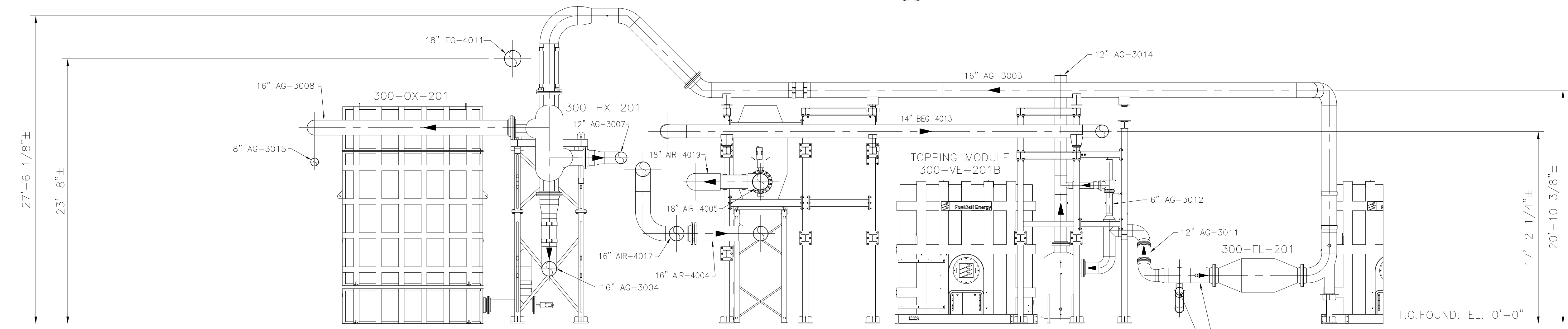
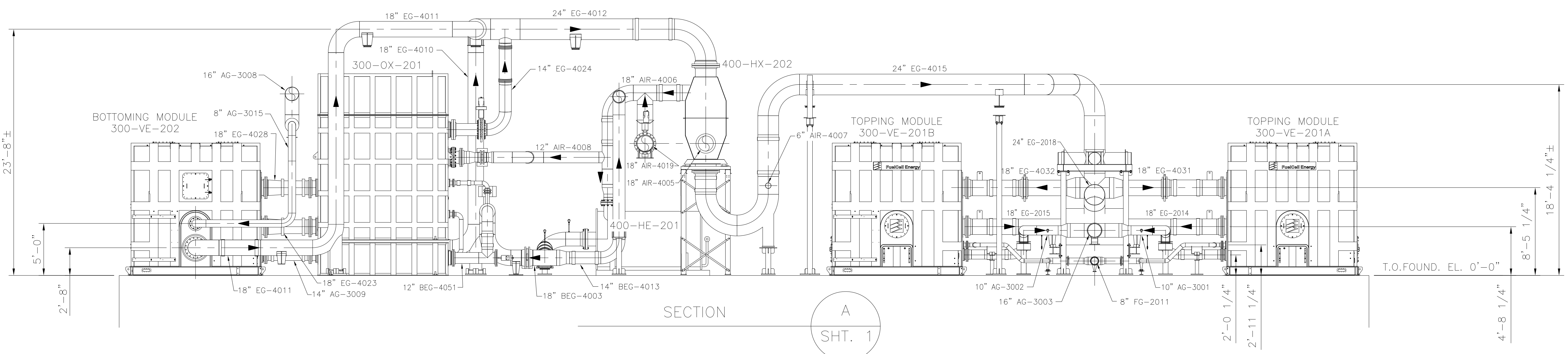
REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
1	RELEASED PER INTERNAL REVIEW	MHB	D. GEORGE	06/24/16
2	REVISED PLANT LAYOUT	MHB	D. GEORGE	10/07/16
3	REVISED PLANT LAYOUT	MHB	D. GEORGE	01/02/17
4	REVISED PLANT LAYOUT	MHB	D. GEORGE	04/13/17




REFERENCE SHEETS - THIS DRAWING  
SHEET 2 - SECTION VIEWS



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	DRAWN: <b>M. BAUMANN 06/24/16</b>	ENGINEER: <b>D. GEORGE 06/24/16</b>		<b>SURESOURCE 4000</b> <b>TRIANGLE ST., DANBURY SITE PLAN</b> <b>OVERALL PLANT VIEWS</b>		
	APPROVED: <b>A. BARLOW 06/24/16</b>	RELEASED: <b>A. HADJIST 06/24/16</b>		SIZE Location <b>D ---</b>	DWG NO <b>615S-33-02</b>	REV <b>4</b>
	ALL DIMENSIONS ARE ±1/16" UNLESS OTHERWISE SPECIFIED. REVISION INDICATOR FLAG NOTE	SCALE AS SHOWN		SHEET 1 OF 2		



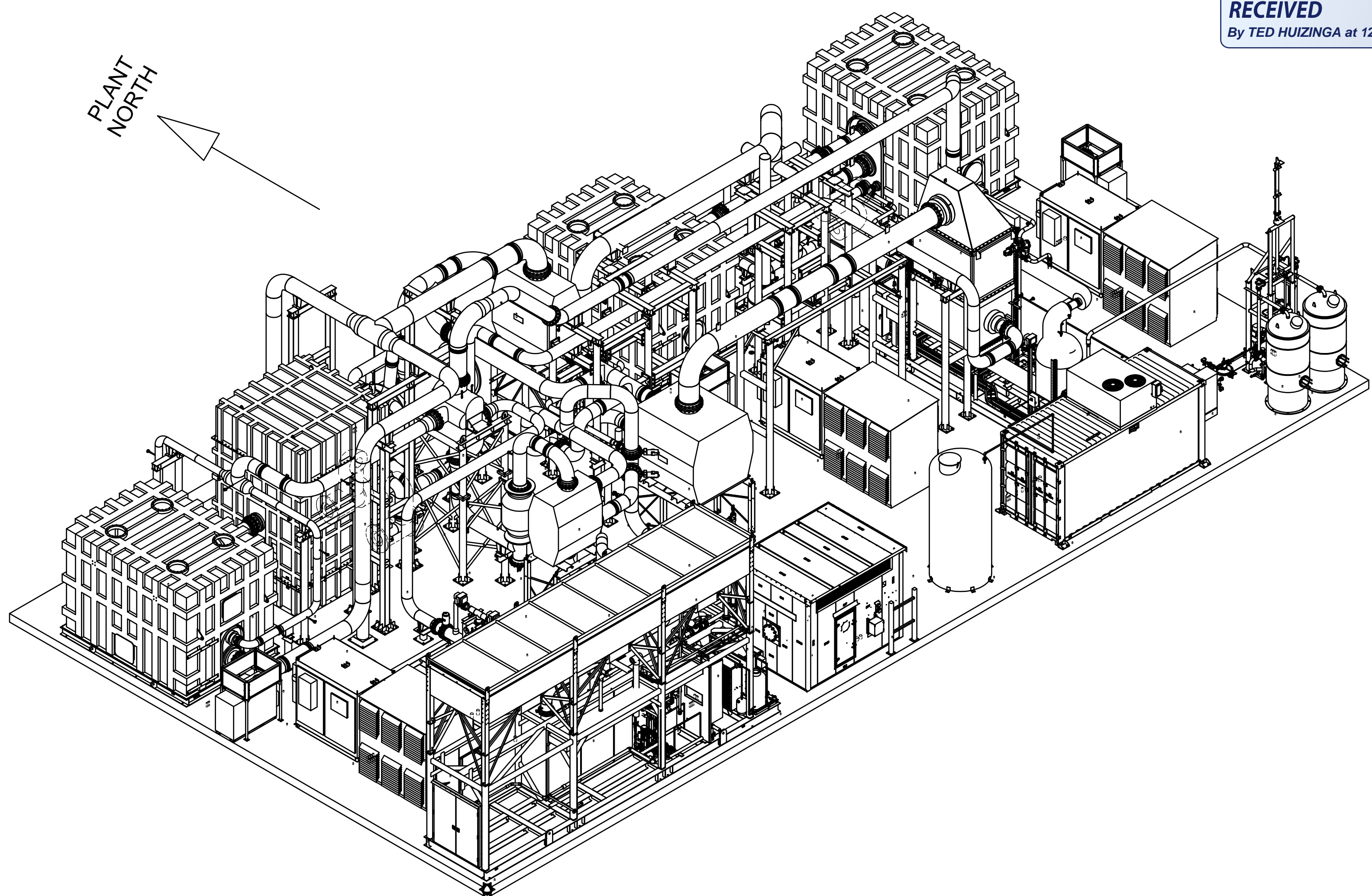
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TITLE <b>SURESOURCE 4000</b> <b>TRIANGLE ST., DANBURY SITE PLAN</b> <b>SECTION VIEWS</b>			
SIZE	Location	DWG NO	REV
<b>D</b>	---	<b>615S-33-02</b>	<b>4</b>
CAGE CODE	SCALE	SHEET	2 OF 2
<b>63131</b>	AS SHOWN		

8 7 6 5 4 3 2 1

**RECEIVED**  
By TED HUIZINGA at 12:27 pm, Jun 29, 2017

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
1	INITIAL RELEASE	KP	A.BARLOW	5/5/17
2	UPDATED	KP	A.BARLOW	6/22/2017

PLANT NORTH  
↖



**NOTES:**

1.

**REFERENCE SHEETS - THIS DRAWING**

- SHEET 2 - LIST OF MATERIALS
- SHEET 3 - PLANT PLAN VIEW
- SHEET 4 - PLANT SECTION VIEWS
- SHEET 5 - PLANT SECTION VIEWS
- SHEET 6 - ENLARGED PLAN VIEW WEST
- SHEET 7 - ENLARGED PLAN VIEW EAST
- SHEET 8 - FUEL PIPING SYSTEM
- SHEET 9 - EXHAUST GAS SYSTEM
- SHEET 10 - EXHAUST GAS SYSTEM
- SHEET 11 - EXHAUST GAS SYSTEM
- SHEET 12 - EXHAUST GAS SYSTEM
- SHEET 13 - EXHAUST GAS SYSTEM
- SHEET 14 - BURNER EXHAUST GAS SYSTEM
- SHEET 15 - BURNER EXHAUST GAS SYSTEM
- SHEET 16 - AIR SYSTEM
- SHEET 17 - AIR SYSTEM
- SHEET 18 - AIR SYSTEM
- SHEET 19 - ANODE GAS SYSTEM
- SHEET 20 - ANODE GAS SYSTEM
- SHEET 21 - ANODE GAS SYSTEM
- SHEET 22 - ANODE GAS SYSTEM
- SHEET 23 - ANODE GAS SYSTEM
- SHEET 24 - ANODE GAS SYSTEM

**REFERENCE DRAWINGS**

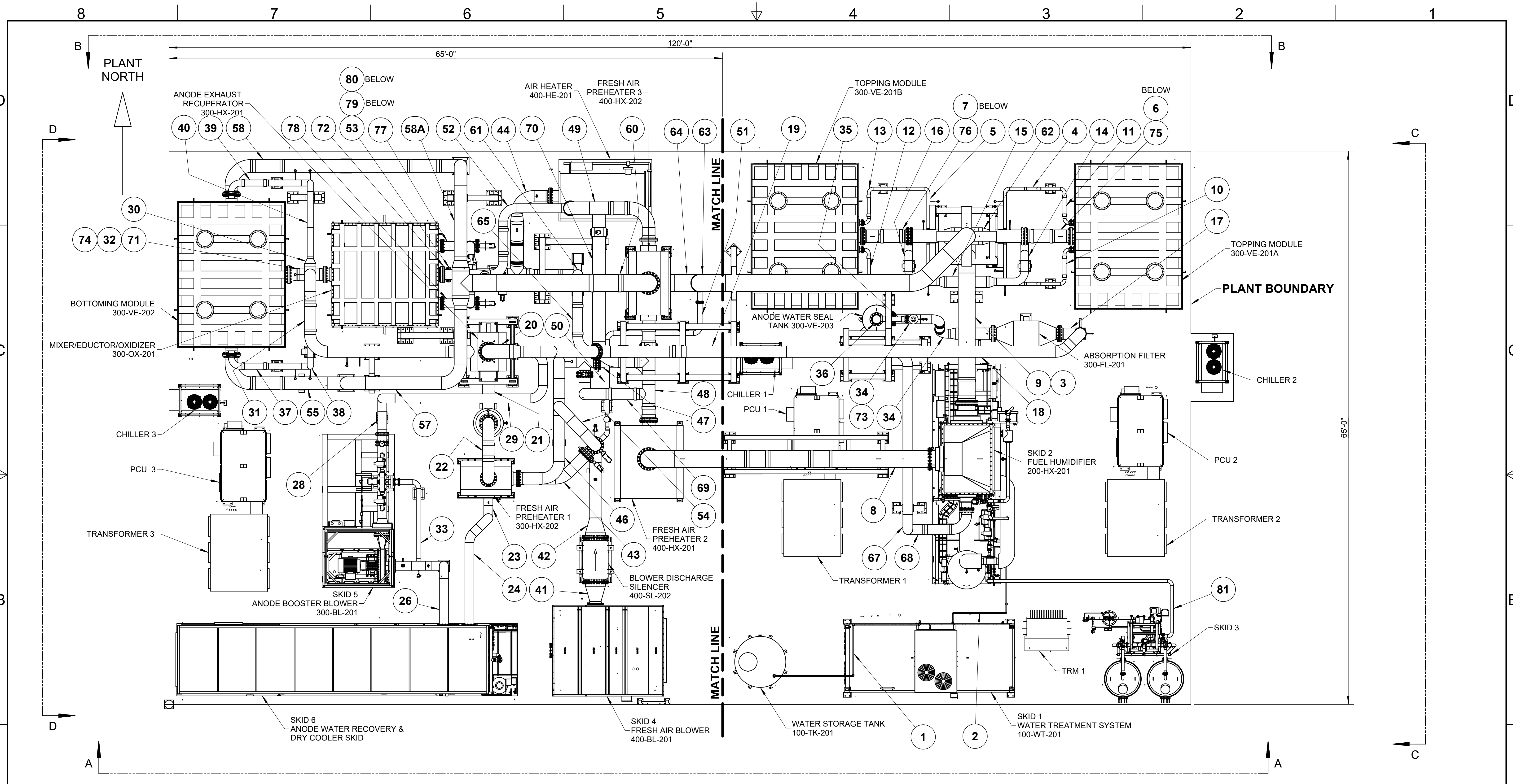
615S-01-01 - LIST OF DRAWINGS

FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC. CAGE CODE <b>63131</b>	SIGNATURES		3 Great Pasture Rd., Danbury, CT 06813	
	DRAWN: <b>K.PERSICO 05/05/17</b>	ENGINEER: <b>D.GEORGE 05/05/17</b>		
	APPROVED: <b>A.BARLOW 05/05/17</b>	RELEASED: <b>P.BEAUDOIN 05/05/17</b>		
	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE ±1/16"			
REVISION INDICATOR FLAG NOTE	SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>	
SCALE NONE		SHEET 1 OF 24		

**SureSource 4000  
PIPING ARRANGEMENT  
PLANT ISOMETRIC VIEW**

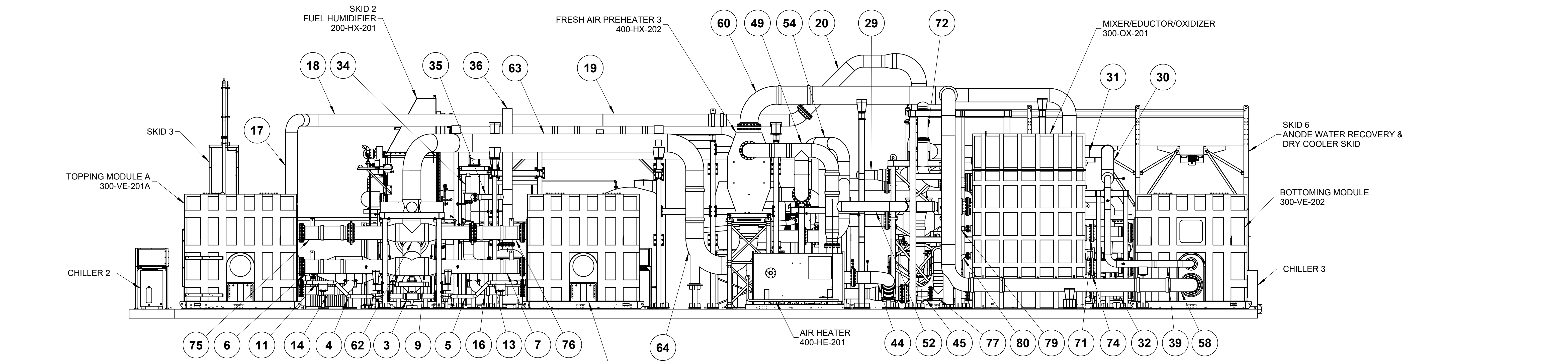
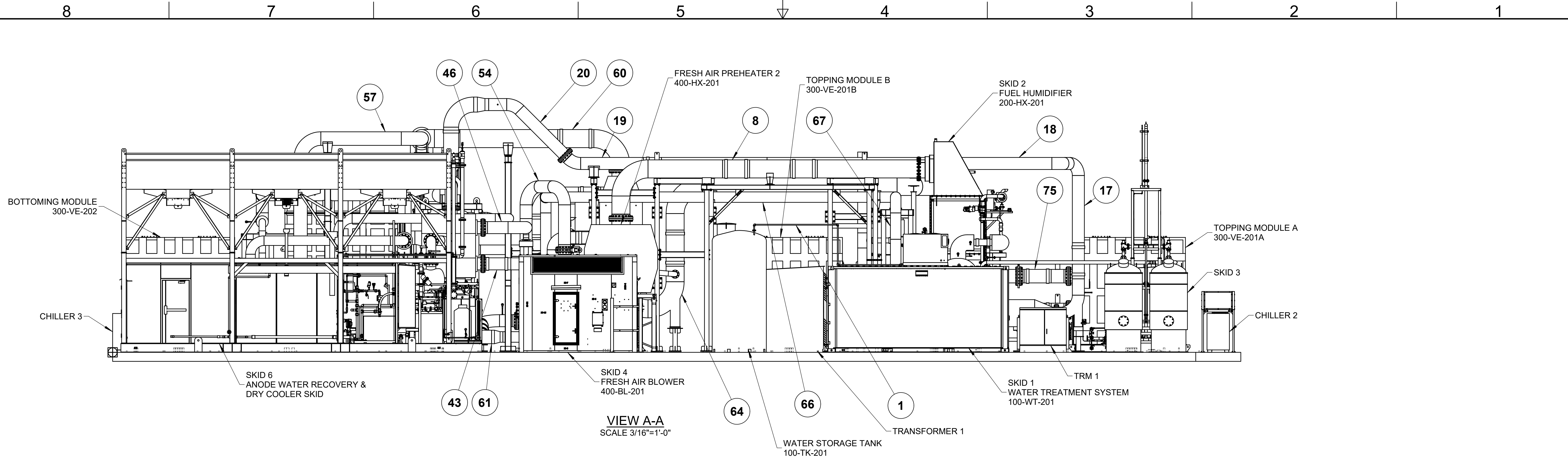
8 7 6 5 4 3 2 1



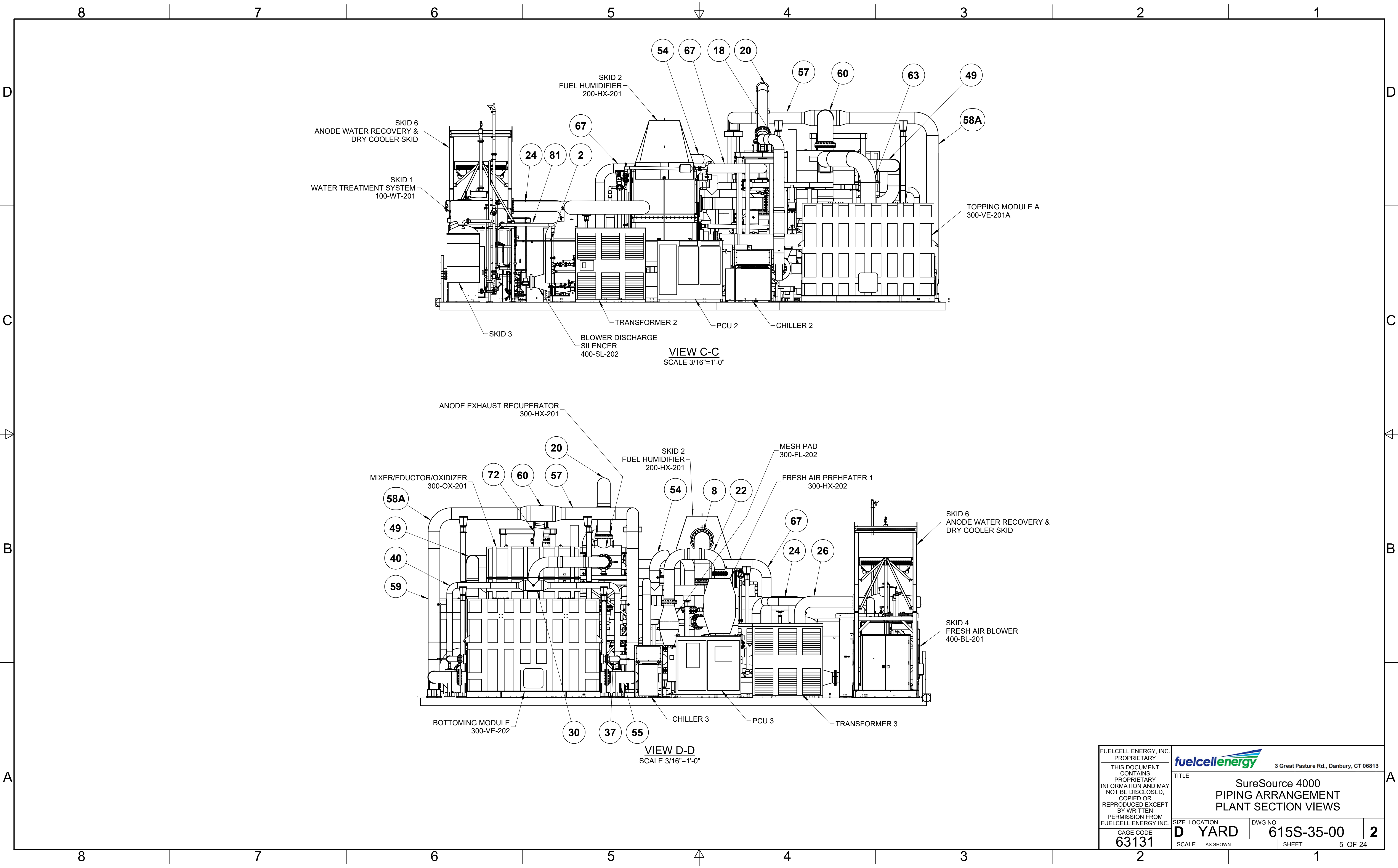


PLAN VIEW  
SCALE 3/16"=1'-0"

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TITLE <b>SureSource 4000          PIPING ARRANGEMENT          PLANT PLAN VIEW</b>		SIZE <b>D YARD</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>	SHEET <b>2</b>
CAGE CODE <b>63131</b>	SCALE AS SHOWN	SHEET 3 OF 24			



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CAGE CODE <b>63131</b>		SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>	<b>2</b>
SCALE AS SHOWN		SHEET 4 OF 24			



VIEW C-C  
SCALE 3/16"=1'-0"

SKID 2 FUEL HUMIDIFIER 200-HX-201

SKID 6 ANODE WATER RECOVERY & DRY COOLER SKID

SKID 1 WATER TREATMENT SYSTEM 100-WT-201

SKID 3

TRANSFORMER 2

PCU 2

CHILLER 2

BLOWER DISCHARGE SILENCER 400-SL-202

TOPPING MODULE A 300-VE-201A

VIEW D-D  
SCALE 3/16"=1'-0"

ANODE EXHAUST RECUPERATOR 300-HX-201

MIXER/EDUCTOR/OXIDIZER 300-OX-201

SKID 2 FUEL HUMIDIFIER 200-HX-201

MESH PAD 300-FL-202

FRESH AIR PREHEATER 1 300-HX-202

SKID 6 ANODE WATER RECOVERY & DRY COOLER SKID

SKID 4 FRESH AIR BLOWER 400-BL-201

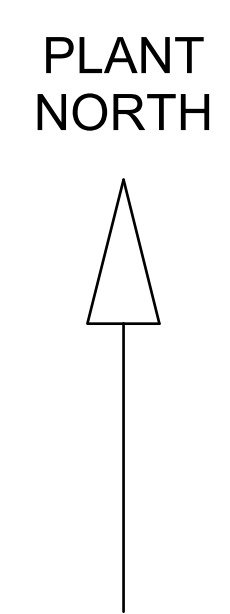
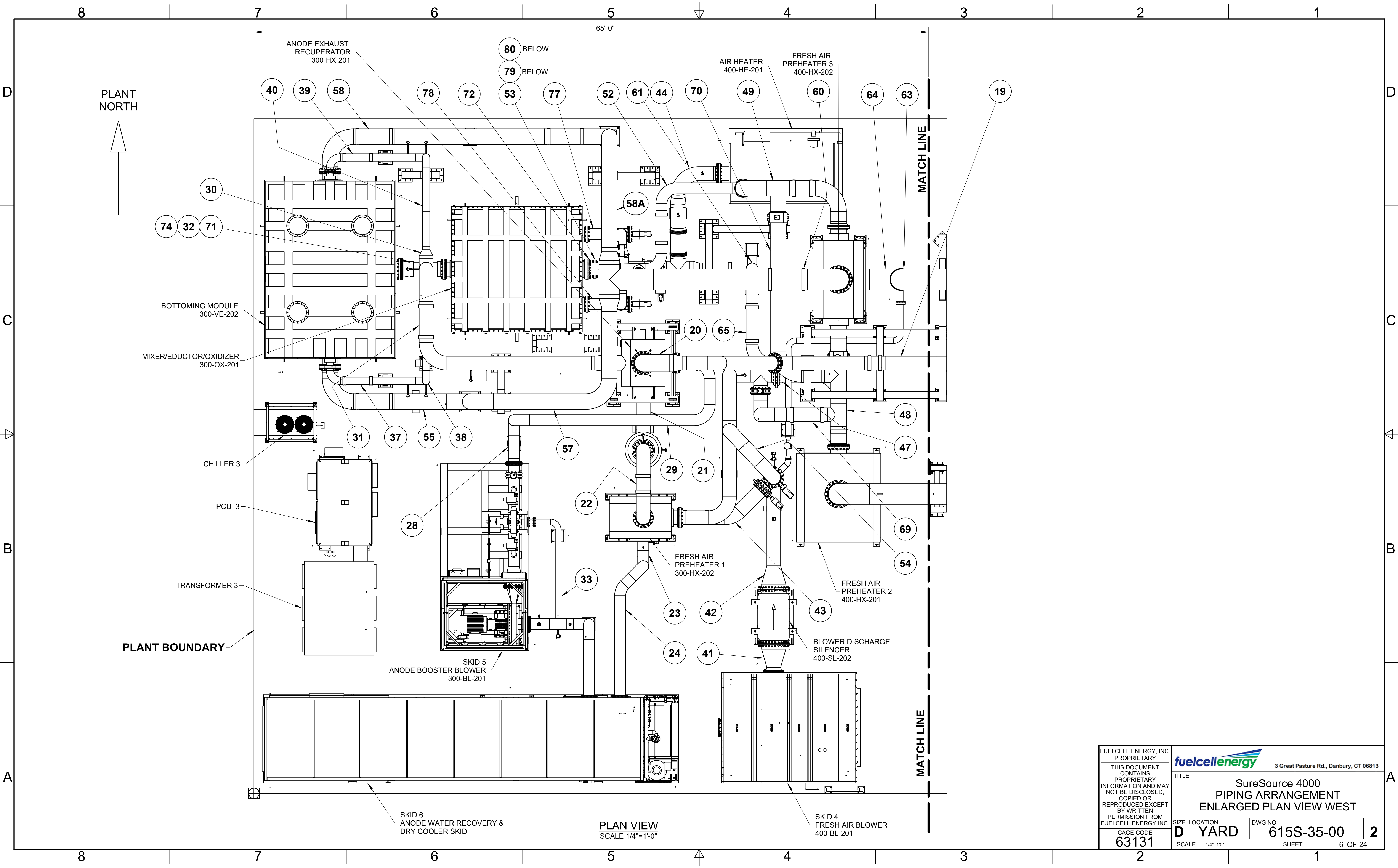
BOTTOMING MODULE 300-VE-202

CHILLER 3

PCU 3

TRANSFORMER 3

FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.			3 Great Pasture Rd., Danbury, CT 06813		
	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          PLANT SECTION VIEWS</b>				
	CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>	<b>2</b>
	SCALE AS SHOWN	SHEET 5 OF 24			

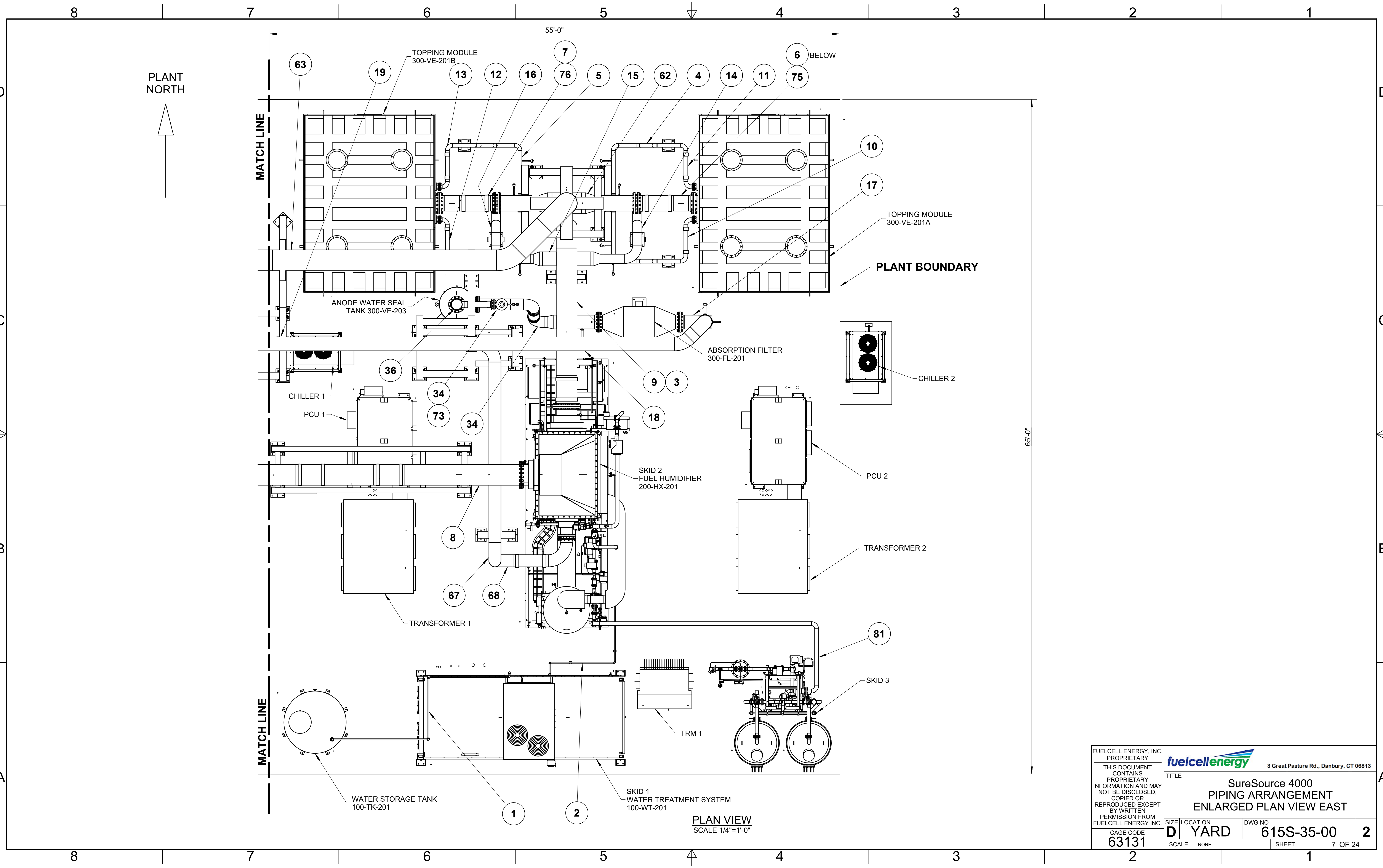


PLAN VIEW  
SCALE 1/4"=1'-0"

FUELCELL ENERGY, INC. PROPRIETARY		fuelcellenergy		3 Great Pasture Rd., Danbury, CT 06813	
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CAGE CODE <b>63131</b>		SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>	<b>2</b>
SCALE 1/4"=1'-0"		SHEET 6 OF 24			

SureSource 4000  
PIPING ARRANGEMENT  
ENLARGED PLAN VIEW WEST





PLANT NORTH

MATCH LINE

MATCH LINE

PLANT BOUNDARY

TOPPING MODULE 300-VE-201B

TOPPING MODULE 300-VE-201A

ANODE WATER SEAL TANK 300-VE-203

ABSORPTION FILTER 300-FL-201

CHILLER 1

CHILLER 2

PCU 1

PCU 2

SKID 2 FUEL HUMIDIFIER 200-HX-201

TRANSFORMER 2

TRANSFORMER 1

81

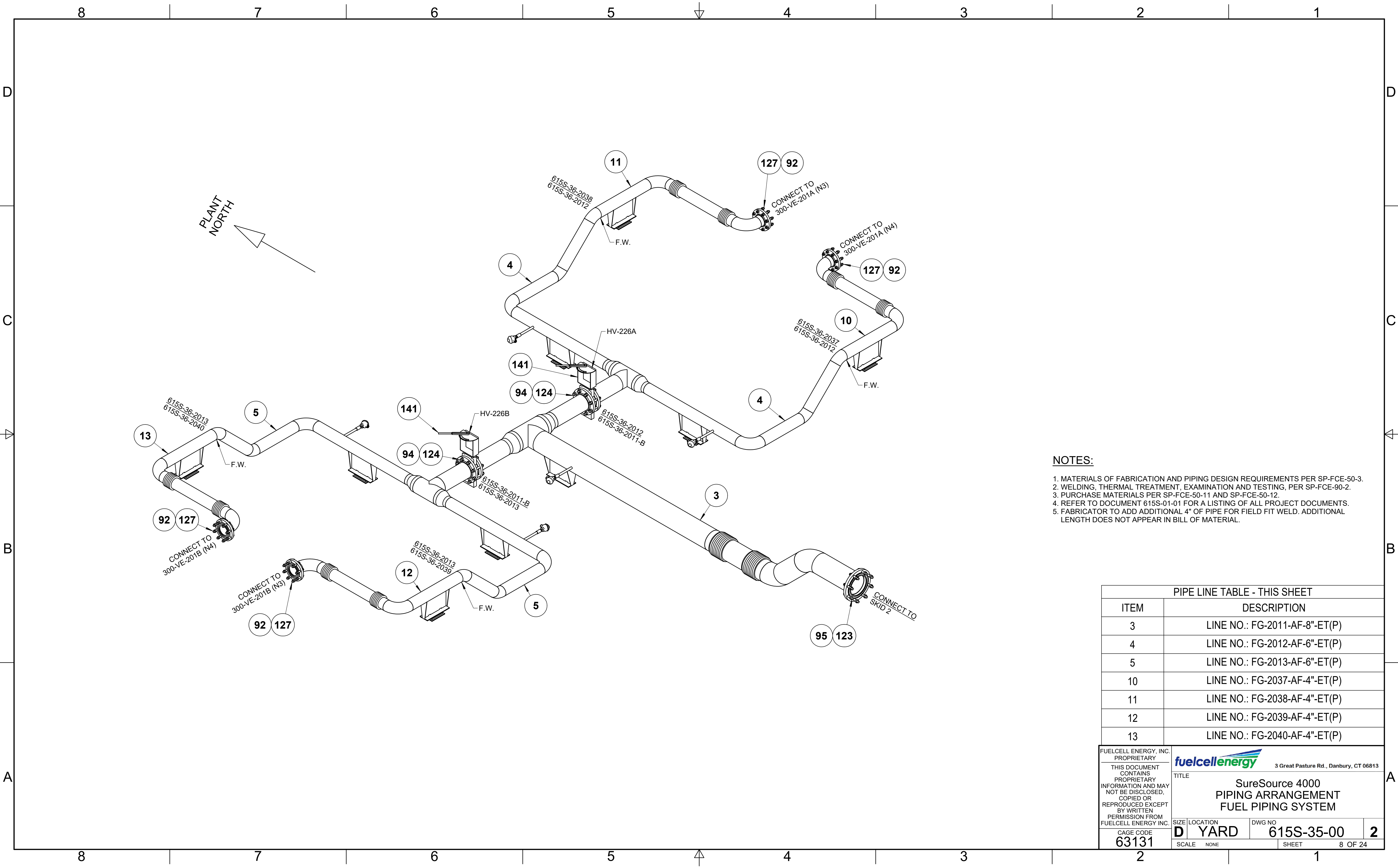
SKID 3

WATER STORAGE TANK 100-TK-201

SKID 1 WATER TREATMENT SYSTEM 100-WT-201

PLAN VIEW  
SCALE 1/4"=1'-0"

FUELCELL ENERGY, INC. PROPRIETARY		fuelcellenergy		3 Great Pasture Rd., Danbury, CT 06813	
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CAGE CODE 63131		SIZE D	LOCATION YARD	DWG NO 615S-35-00	SHEET 2
SCALE NONE		SHEET 7 OF 24			




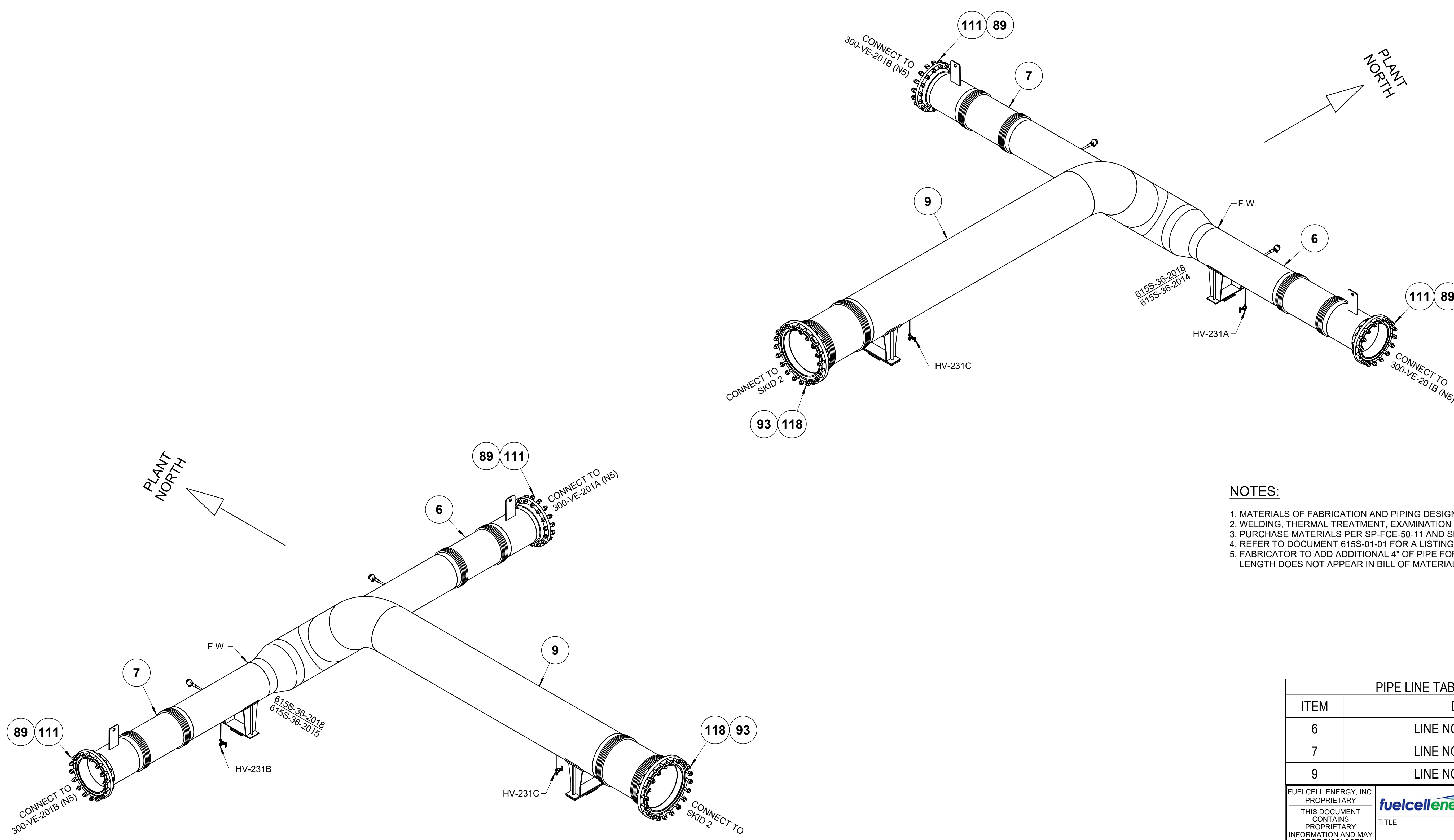
**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
3	LINE NO.: FG-2011-AF-8"-ET(P)		
4	LINE NO.: FG-2012-AF-6"-ET(P)		
5	LINE NO.: FG-2013-AF-6"-ET(P)		
10	LINE NO.: FG-2037-AF-4"-ET(P)		
11	LINE NO.: FG-2038-AF-4"-ET(P)		
12	LINE NO.: FG-2039-AF-4"-ET(P)		
13	LINE NO.: FG-2040-AF-4"-ET(P)		


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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          FUEL PIPING SYSTEM</b>	
	CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>
SCALE NONE		SHEET 8 OF 24

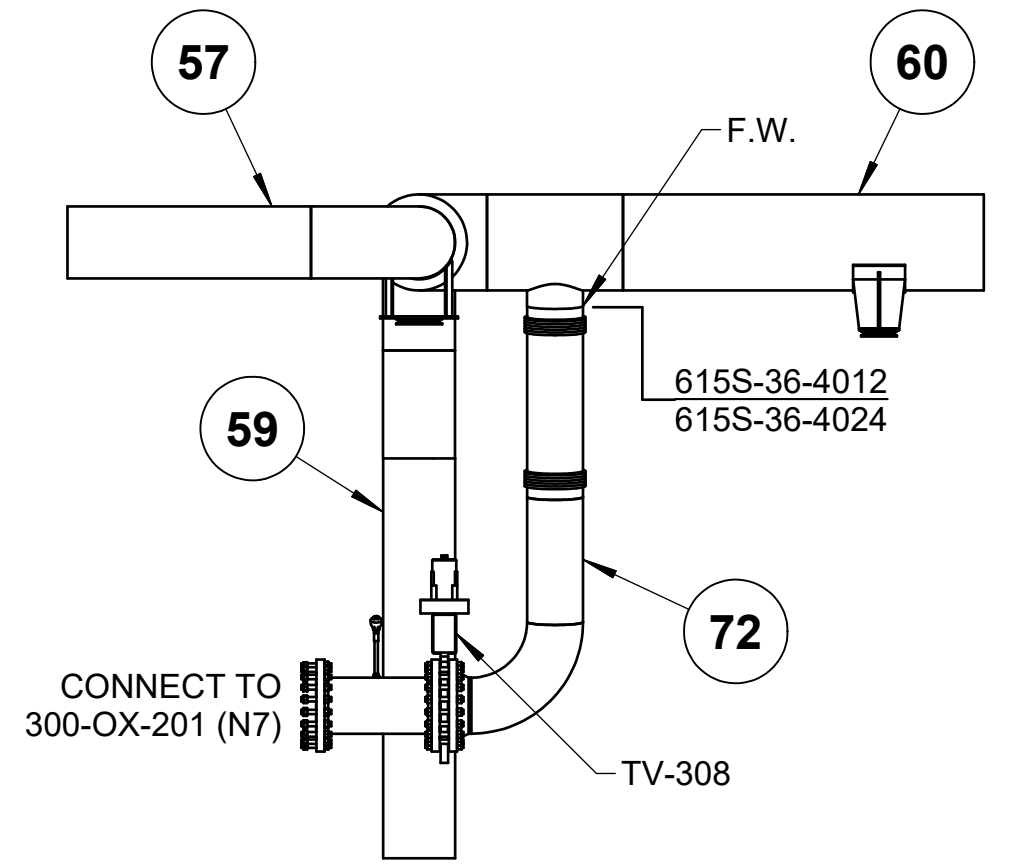
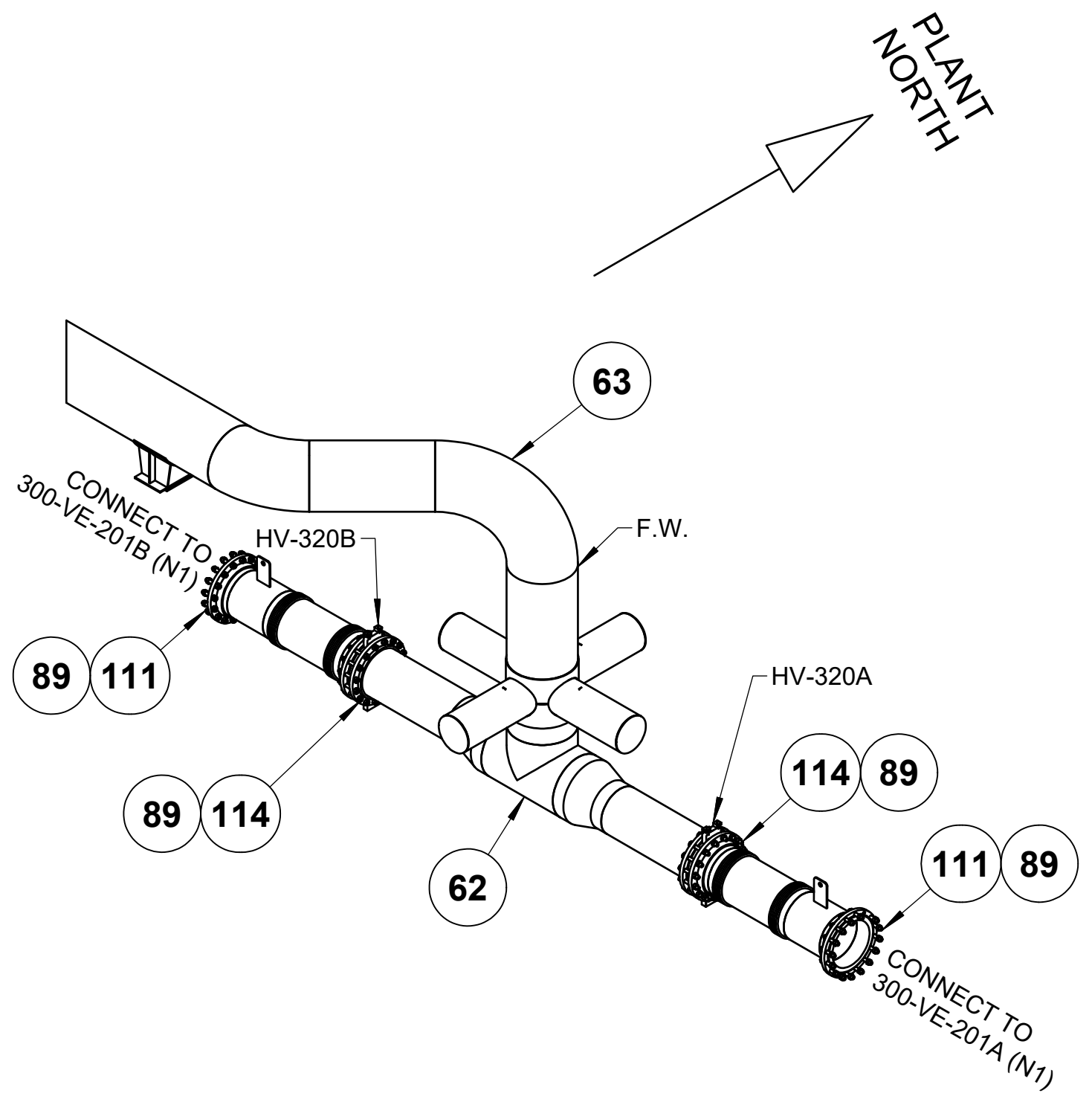
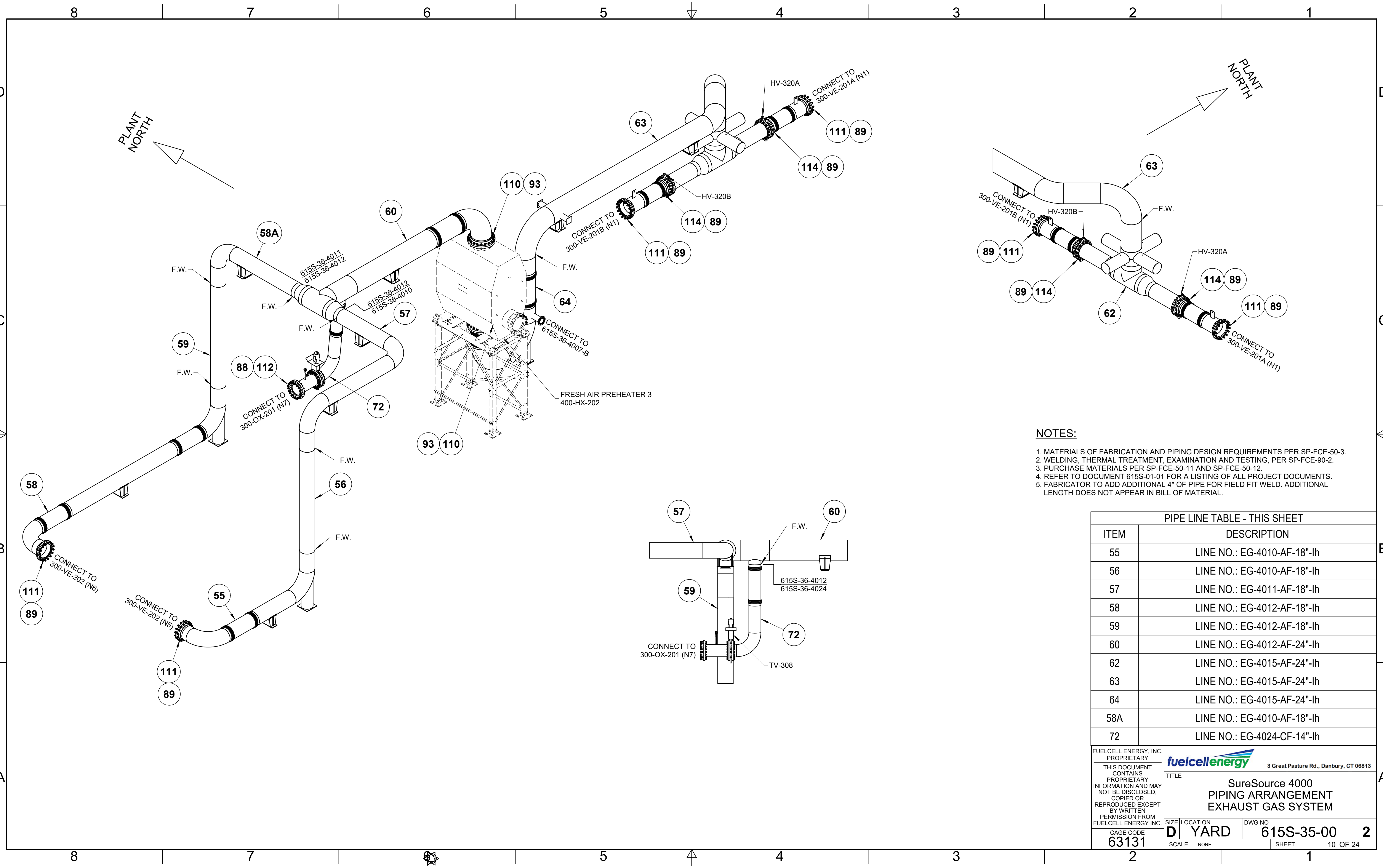


- NOTES:**
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
6	LINE NO.: EG-2014-AF-18"-lh		
7	LINE NO.: EG-2015-AF-18"-lh		
9	LINE NO.: EG-2018-AF-24"-lh		

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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          EXHAUST GAS SYSTEM</b>		
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>	<b>2</b>
SCALE NONE		SHEET 9 OF 24	




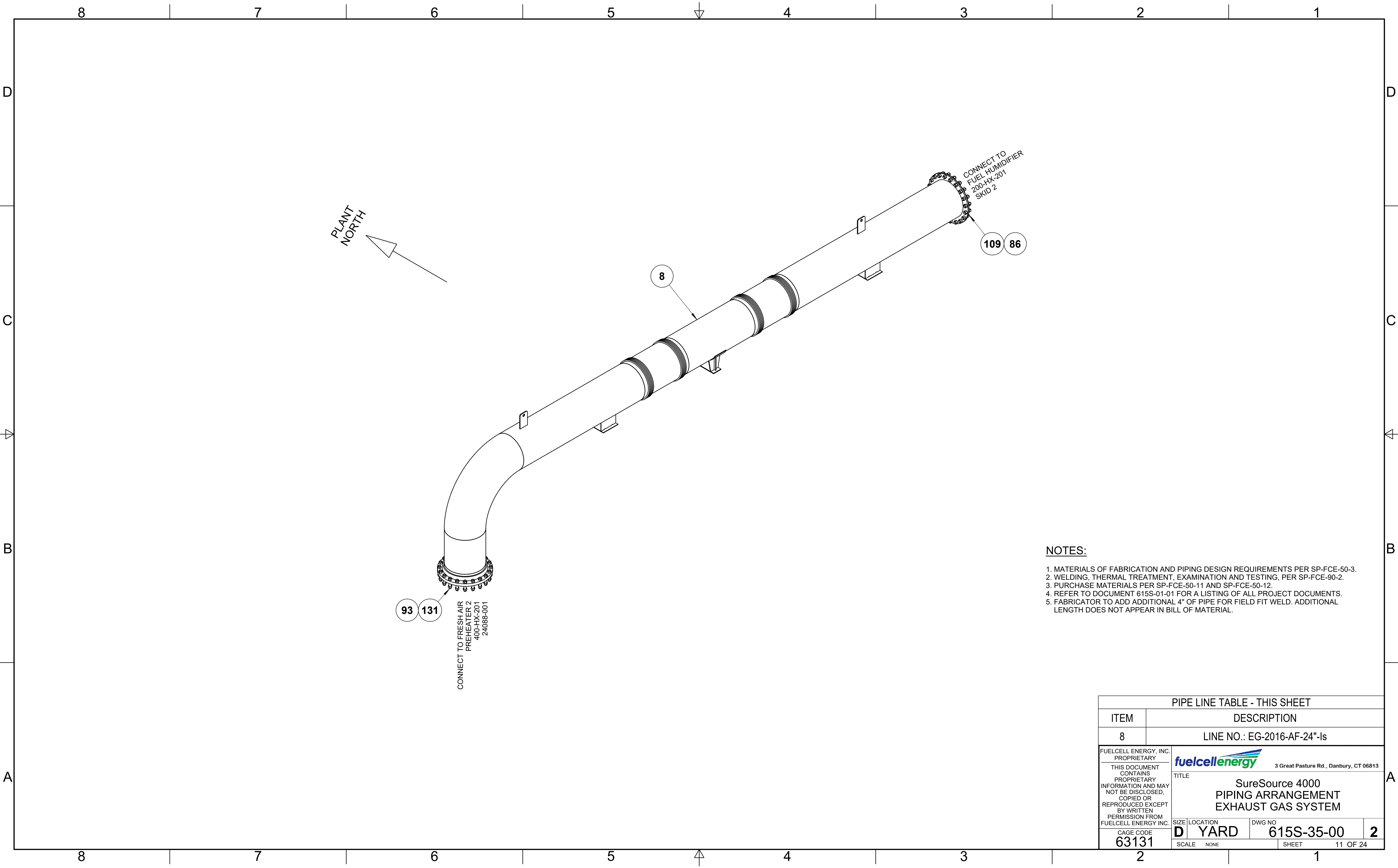
**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
55	LINE NO.: EG-4010-AF-18"-lh
56	LINE NO.: EG-4010-AF-18"-lh
57	LINE NO.: EG-4011-AF-18"-lh
58	LINE NO.: EG-4012-AF-18"-lh
59	LINE NO.: EG-4012-AF-18"-lh
60	LINE NO.: EG-4012-AF-24"-lh
62	LINE NO.: EG-4015-AF-24"-lh
63	LINE NO.: EG-4015-AF-24"-lh
64	LINE NO.: EG-4015-AF-24"-lh
58A	LINE NO.: EG-4010-AF-18"-lh
72	LINE NO.: EG-4024-CF-14"-lh

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		<b>SureSource 4000 PIPING ARRANGEMENT EXHAUST GAS SYSTEM</b>	
CAGE CODE	SIZE	LOCATION	DWG NO
<b>63131</b>	<b>D</b>	<b>YARD</b>	<b>615S-35-00</b>
	SCALE	NONE	SHEET
			<b>10 OF 24</b>



PLANT NORTH

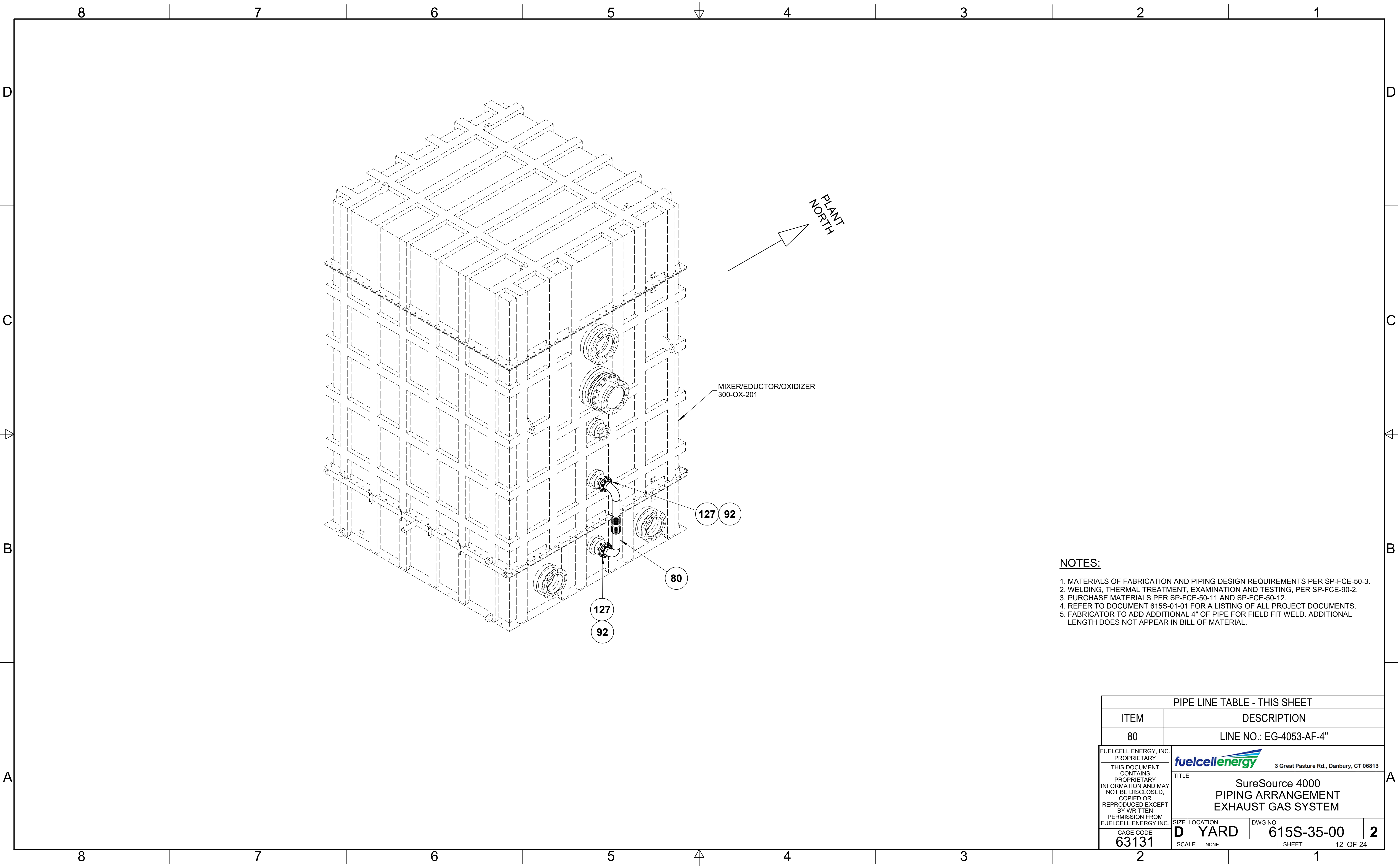
CONNECT TO FUEL HUMIDIFIER  
200-HX-201  
SKID 2

CONNECT TO FRESH AIR  
PREHEATER 2  
400-HX-201  
24088-001

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
8	LINE NO.: EG-2016-AF-24"-Is		
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	<small>CAGE CODE</small> <b>63131</b>	<small>SIZE</small> <b>D</b>	<small>LOCATION</small> <b>YARD</b>
	<small>SCALE</small> NONE	<small>SHEET</small> 11 OF 24	<small>2</small>

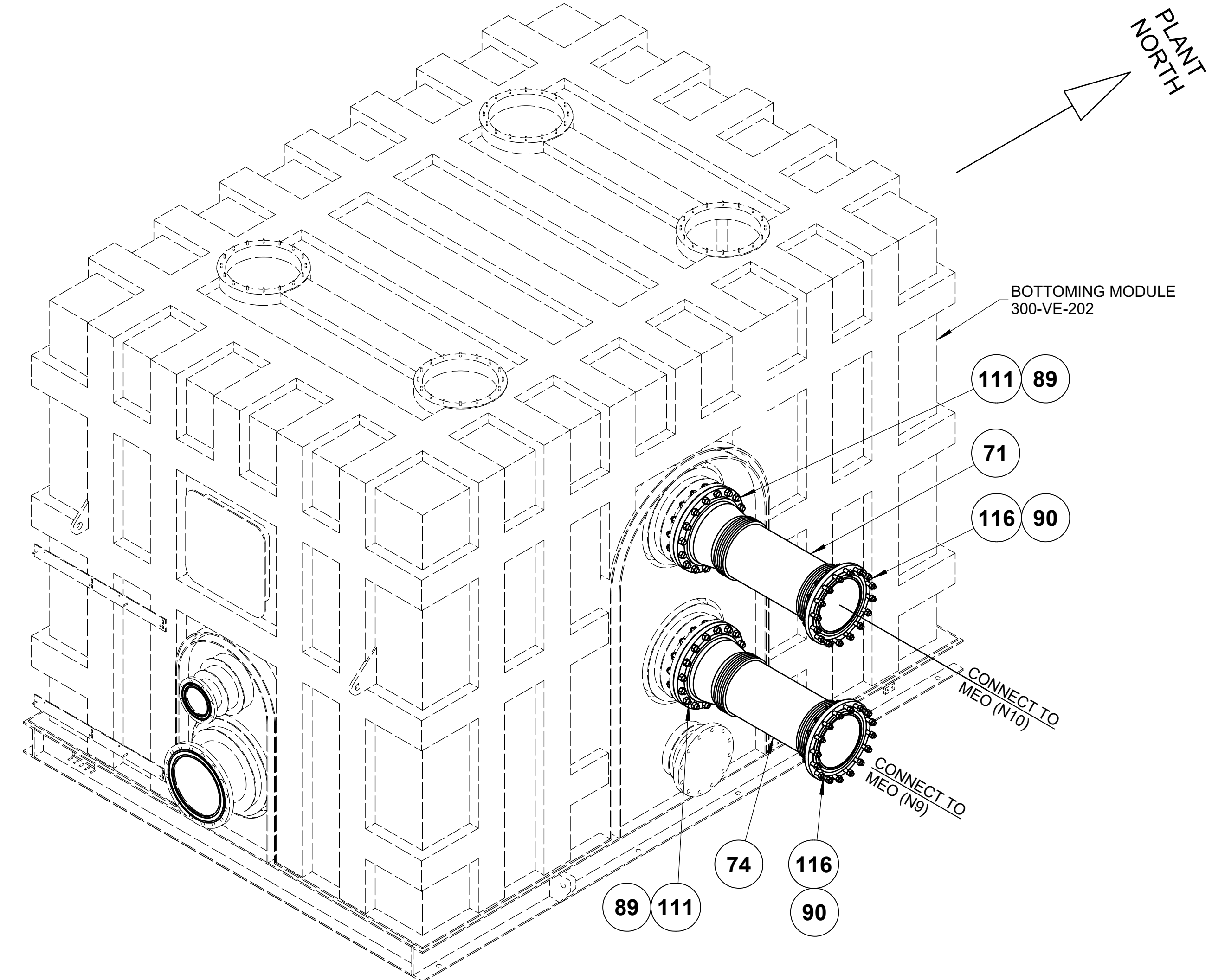
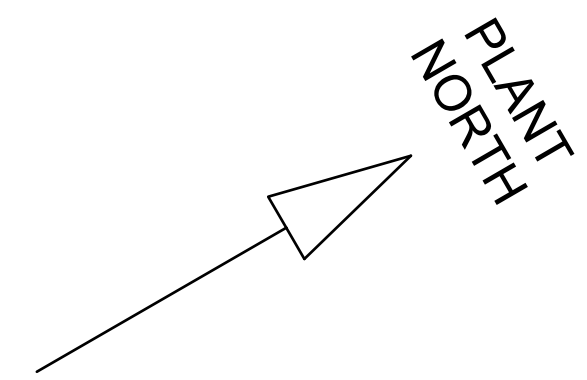
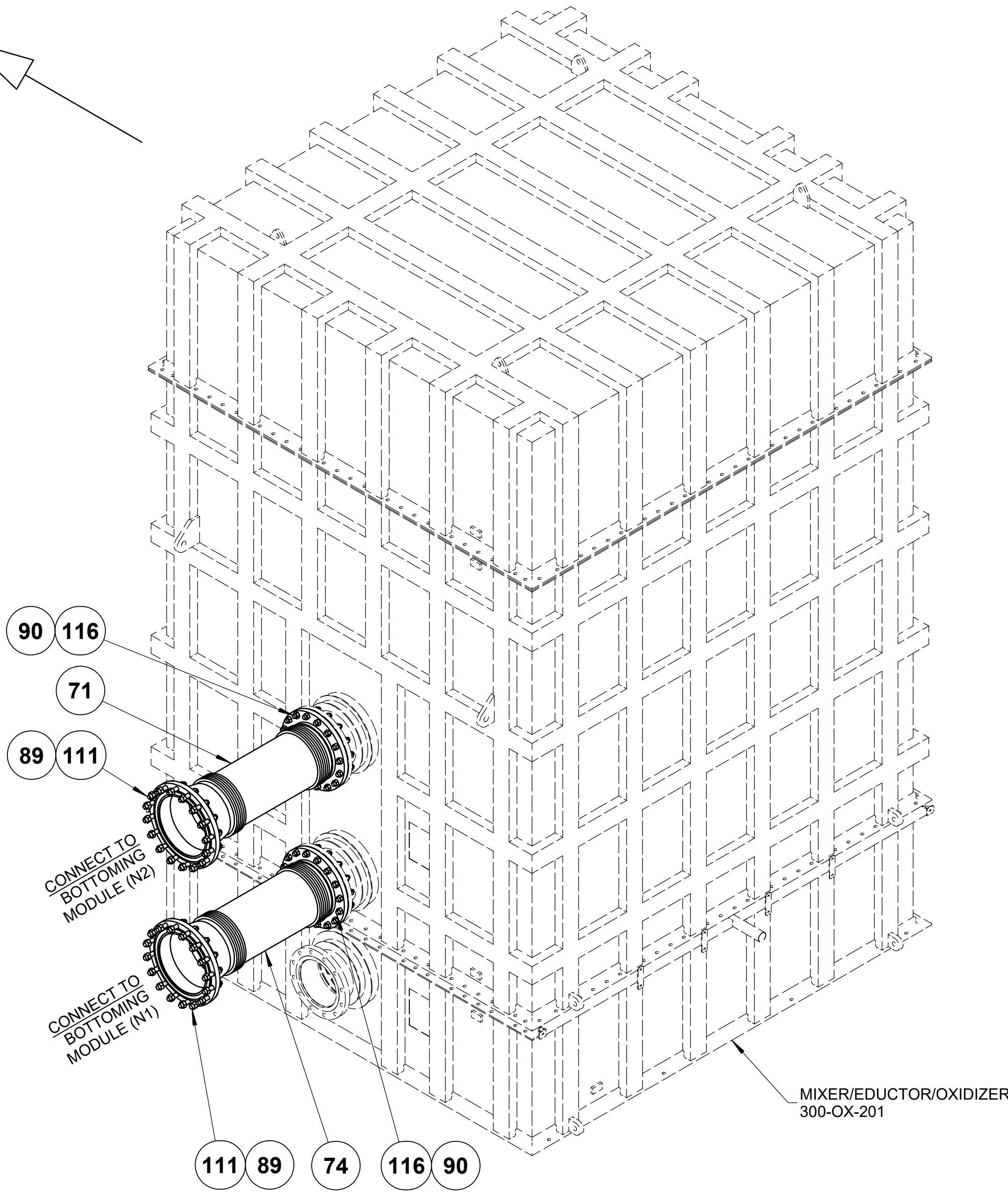
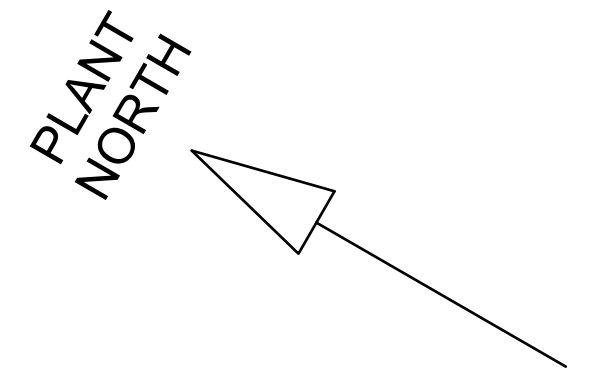


**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.


PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
80	LINE NO.: EG-4053-AF-4"		
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	<small>CAGE CODE</small> <b>63131</b>	<small>SIZE</small> <b>D</b>	<small>LOCATION</small> <b>YARD</b>
	<small>DWG NO</small> <b>615S-35-00</b>	<small>SHEET</small> <b>2</b>	<small>OF</small> <b>12</b>
	<small>SCALE</small> NONE	<small>SHEET</small> 12 OF 24	

8 7 6 5 4 3 2 1

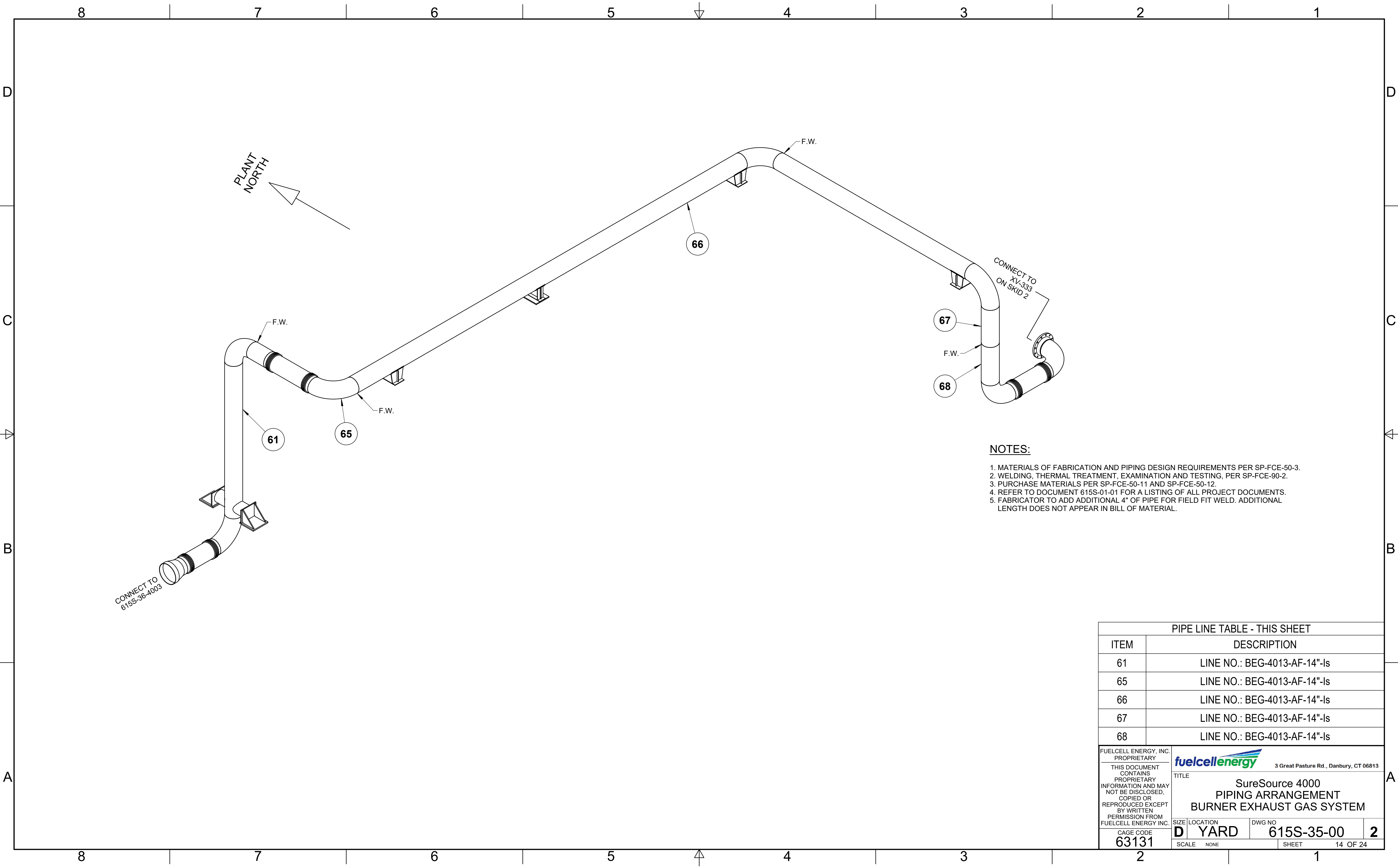


- NOTES:**
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
71	LINE NO.: EG-4023-AF-18"-lh
74	LINE NO.: EG-4028-AF-18"-lh

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	<b>SureSource 4000          PIPING ARRANGEMENT          EXHAUST GAS SYSTEM</b>	
SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>	SHEET <b>2</b>
SCALE NONE	SHEET 13 OF 24	

8 7 6 5 4 3 2 1




**NOTES:**

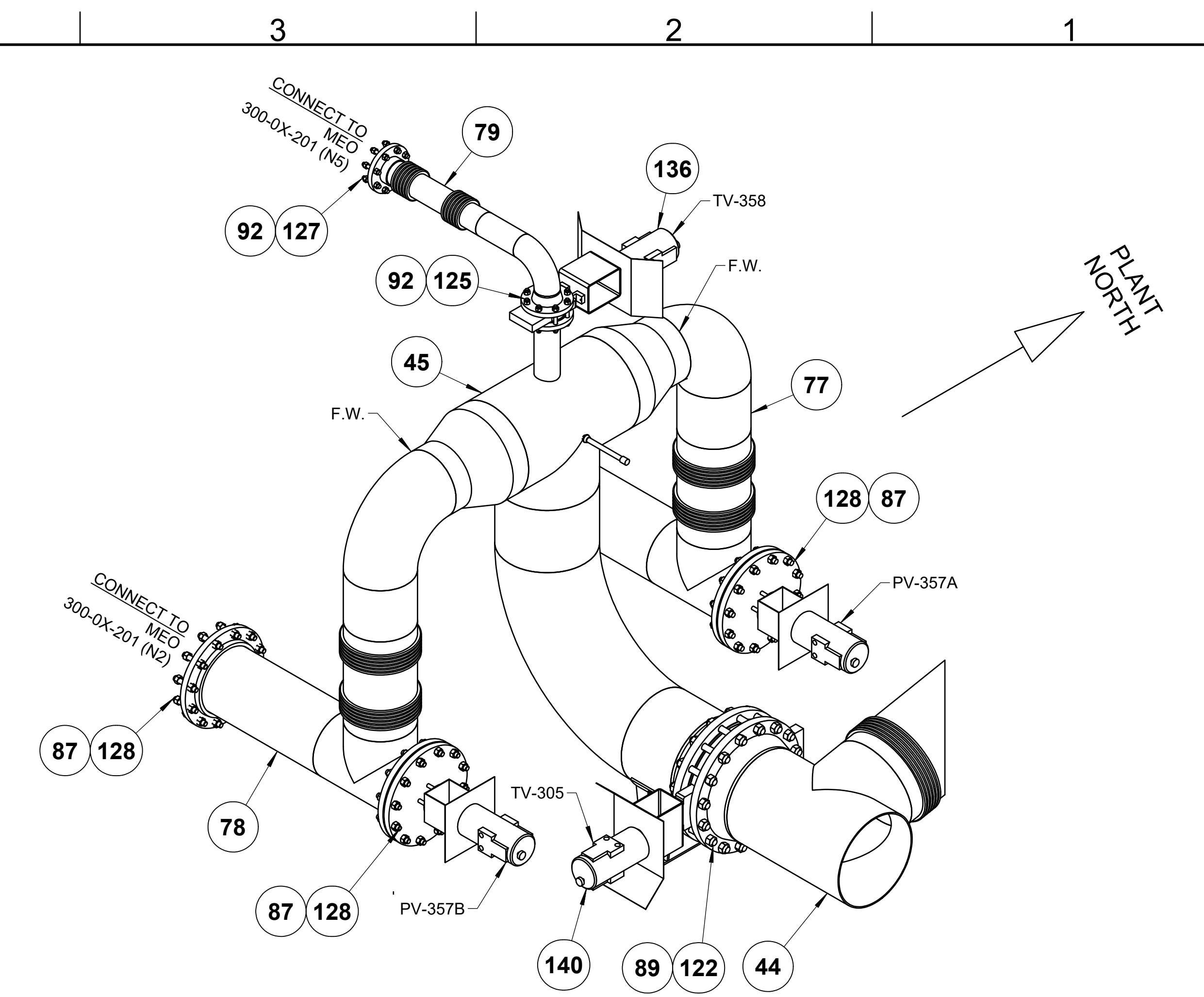
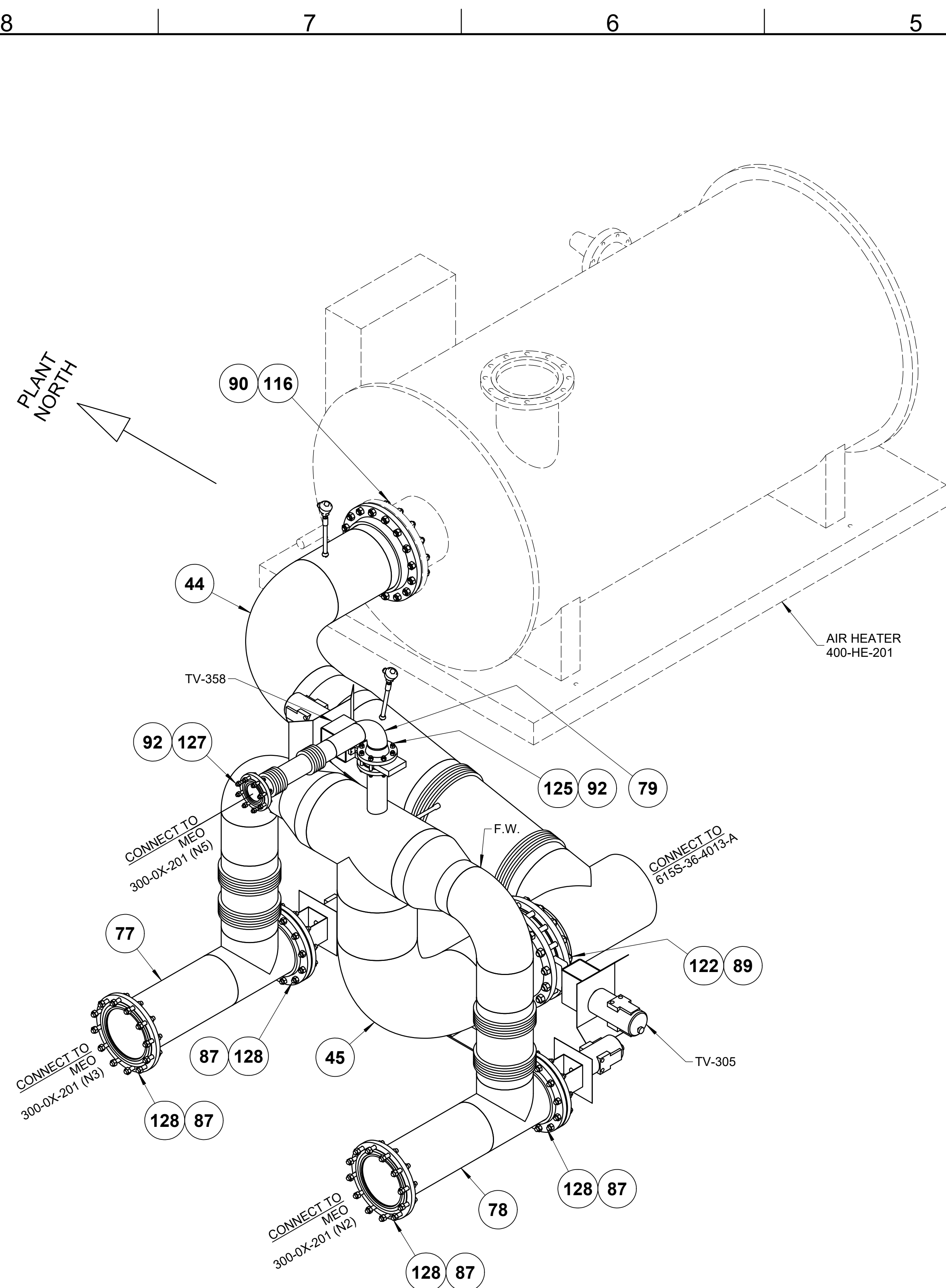
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
61	LINE NO.: BEG-4013-AF-14"-Is		
65	LINE NO.: BEG-4013-AF-14"-Is		
66	LINE NO.: BEG-4013-AF-14"-Is		
67	LINE NO.: BEG-4013-AF-14"-Is		
68	LINE NO.: BEG-4013-AF-14"-Is		

FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.		 3 Great Pasture Rd., Danbury, CT 06813	
TITLE <b>SureSource 4000          PIPING ARRANGEMENT          BURNER EXHAUST GAS SYSTEM</b>		SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
CAGE CODE <b>63131</b>	SCALE NONE	SHEET	<b>14 OF 24</b>




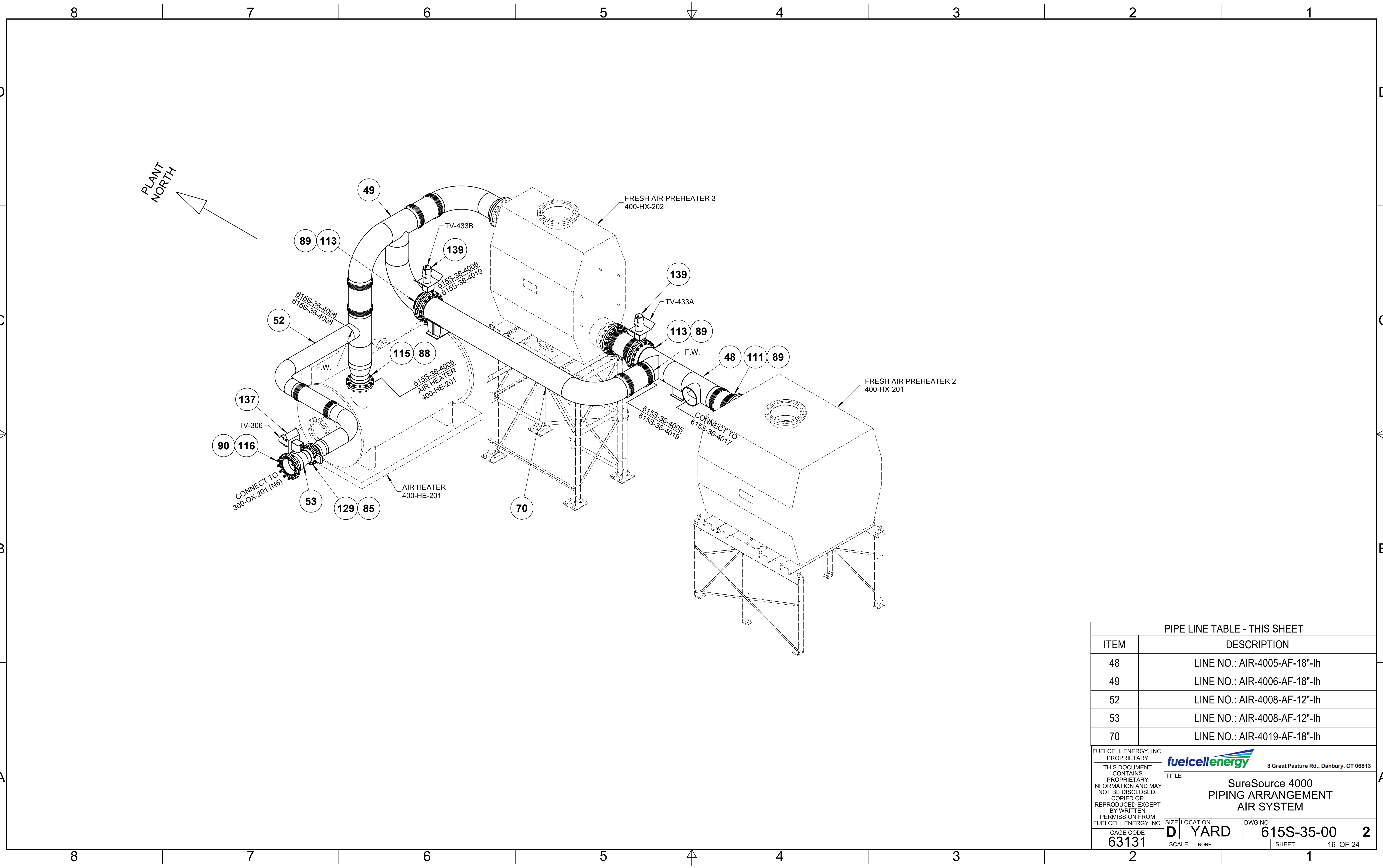


**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
44	LINE NO.: BEG-4003-AF-18"-lh
45	LINE NO.: BEG-4003-AF-18"-lh
77	LINE NO.: BEG-4050-AF-12"-lh
78	LINE NO.: BEG-4051-AF-12"-lh
79	LINE NO.: BEG-4052-AF-4"


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	<b>SureSource 4000          PIPING ARRANGEMENT          BURNER EXHAUST GAS SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NONE	SHEET	<b>2</b> 15 OF 24

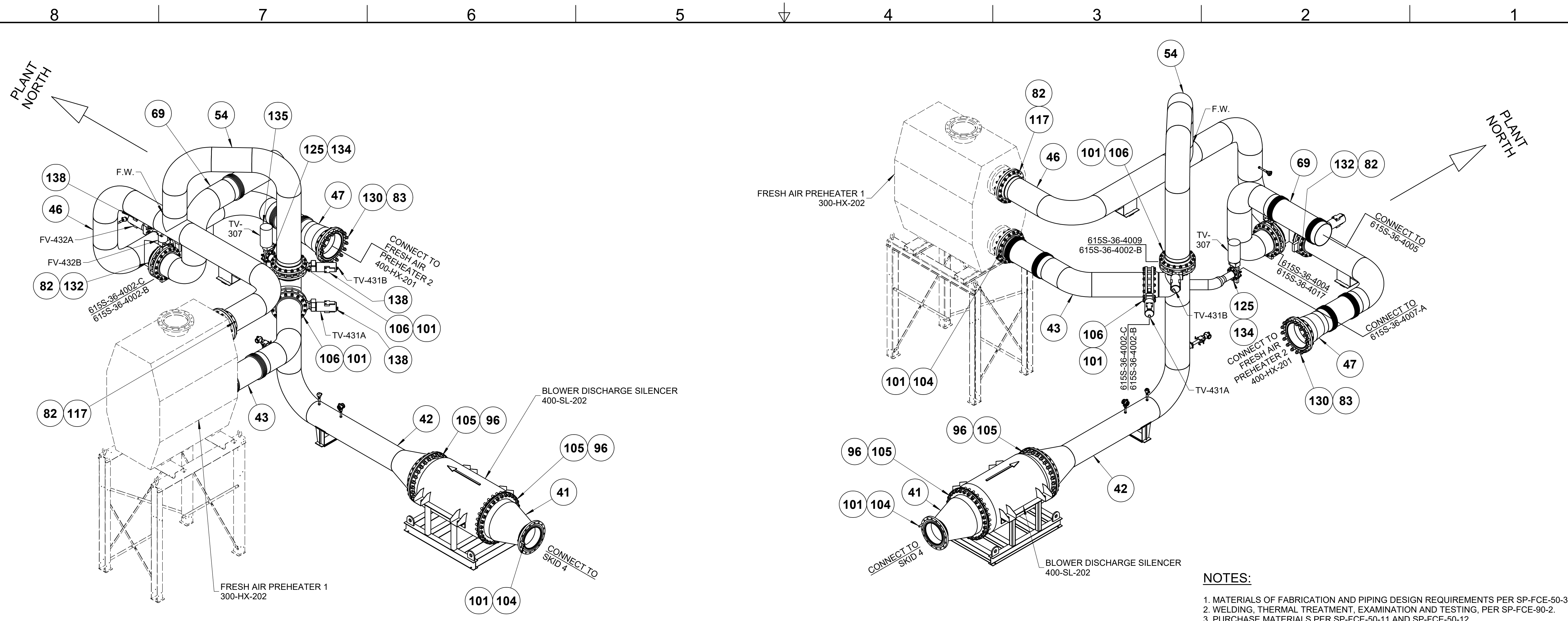


PLANT NORTH

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
48	LINE NO.: AIR-4005-AF-18"-lh
49	LINE NO.: AIR-4006-AF-18"-lh
52	LINE NO.: AIR-4008-AF-12"-lh
53	LINE NO.: AIR-4008-AF-12"-lh
70	LINE NO.: AIR-4019-AF-18"-lh


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THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.		TITLE <b>SureSource 4000 PIPING ARRANGEMENT AIR SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO. <b>615S-35-00</b>
SCALE NONE	SHEET 16 OF 24		<b>2</b>

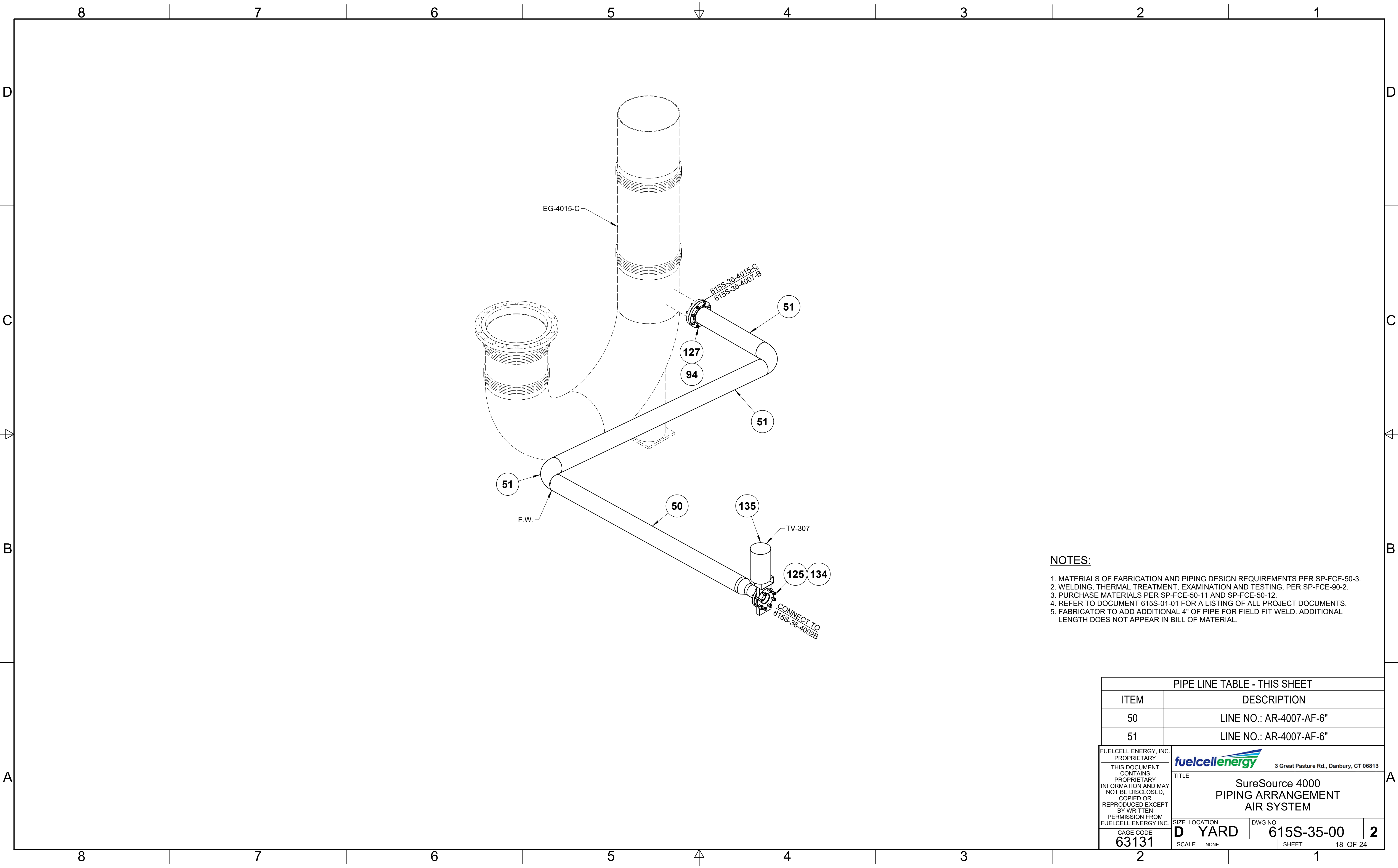


- NOTES:**
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
41	LINE NO.: AIR-4002-AF-16"
42	LINE NO.: AIR-4002-AF-16"
43	LINE NO.: AIR-4002-AF-16"
46	LINE NO.: AIR-4004-AF-16"-lh
47	LINE NO.: AIR-4004-AF-16"-lh
54	LINE NO.: AIR-4009-AF-16"
69	LINE NO.: AIR-4017-AF-16"-lh

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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          AIR SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NON	SHEET 17 OF 24	



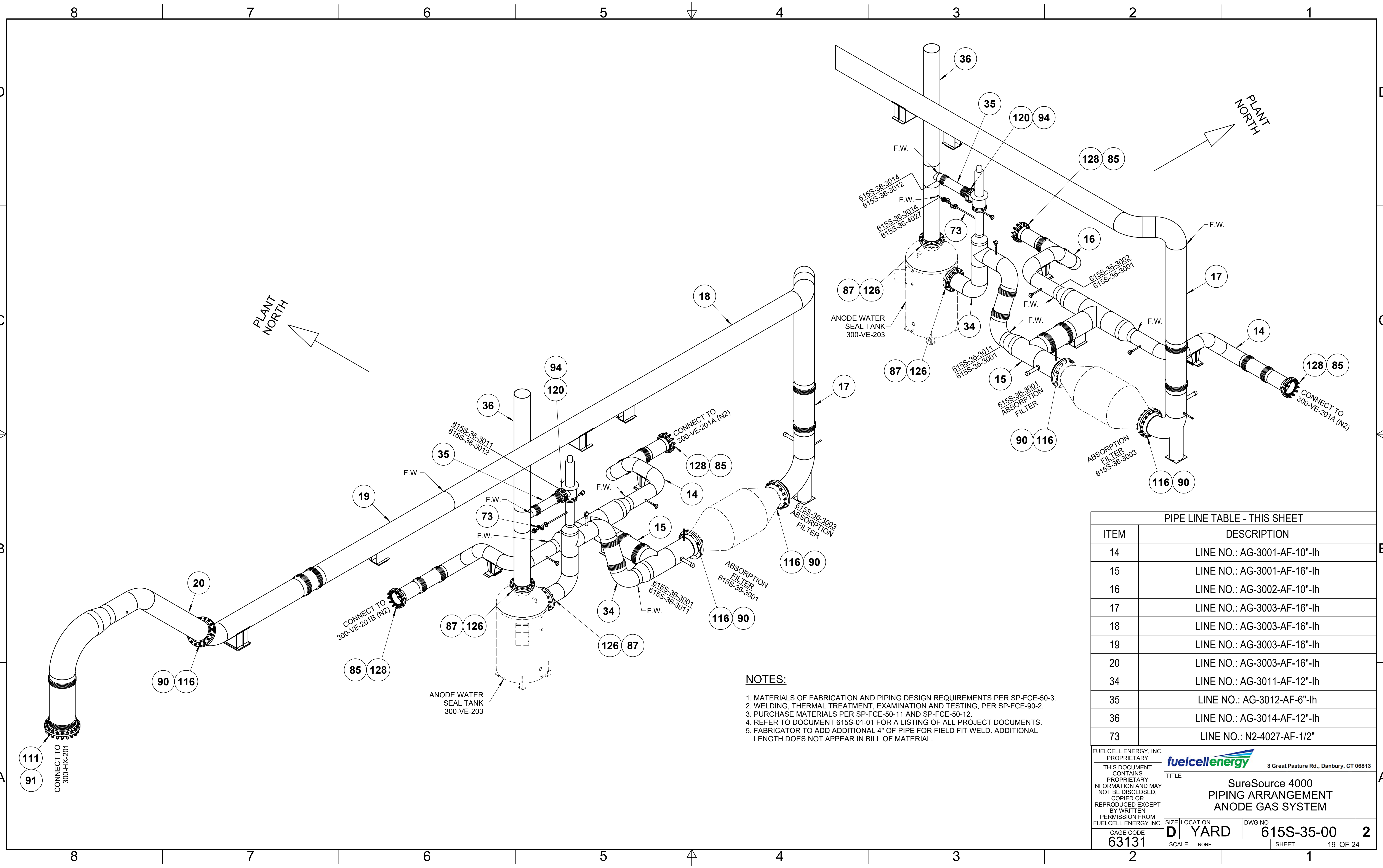
**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
50	LINE NO.: AR-4007-AF-6"		
51	LINE NO.: AR-4007-AF-6"		


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	<b>TITLE</b> SureSource 4000 PIPING ARRANGEMENT AIR SYSTEM	
	<small>CAGE CODE</small> <b>63131</b>	<small>SIZE</small> <b>D</b> <small>LOCATION</small> <b>YARD</b> <small>DWG NO</small> <b>615S-35-00</b> <b>2</b>
<small>SCALE</small> NONE <small>SHEET</small> 18 OF 24		

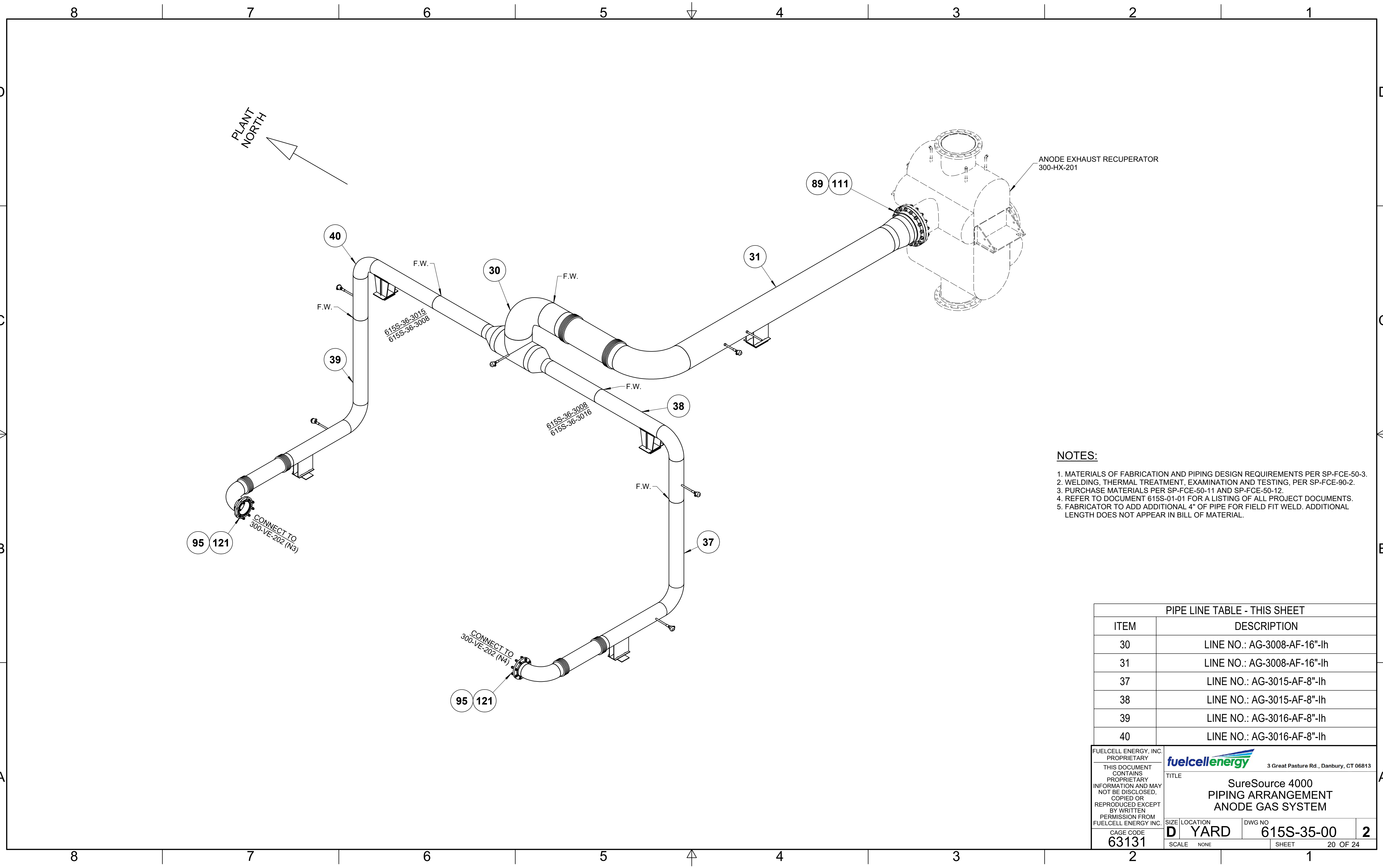


- NOTES:**
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

**PIPE LINE TABLE - THIS SHEET**

ITEM	DESCRIPTION
14	LINE NO.: AG-3001-AF-10"-lh
15	LINE NO.: AG-3001-AF-16"-lh
16	LINE NO.: AG-3002-AF-10"-lh
17	LINE NO.: AG-3003-AF-16"-lh
18	LINE NO.: AG-3003-AF-16"-lh
19	LINE NO.: AG-3003-AF-16"-lh
20	LINE NO.: AG-3003-AF-16"-lh
34	LINE NO.: AG-3011-AF-12"-lh
35	LINE NO.: AG-3012-AF-6"-lh
36	LINE NO.: AG-3014-AF-12"-lh
73	LINE NO.: N2-4027-AF-1/2"


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	<b>SureSource 4000</b> <b>PIPING ARRANGEMENT</b> <b>ANODE GAS SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NONE	SHEET	<b>2</b> 19 OF 24

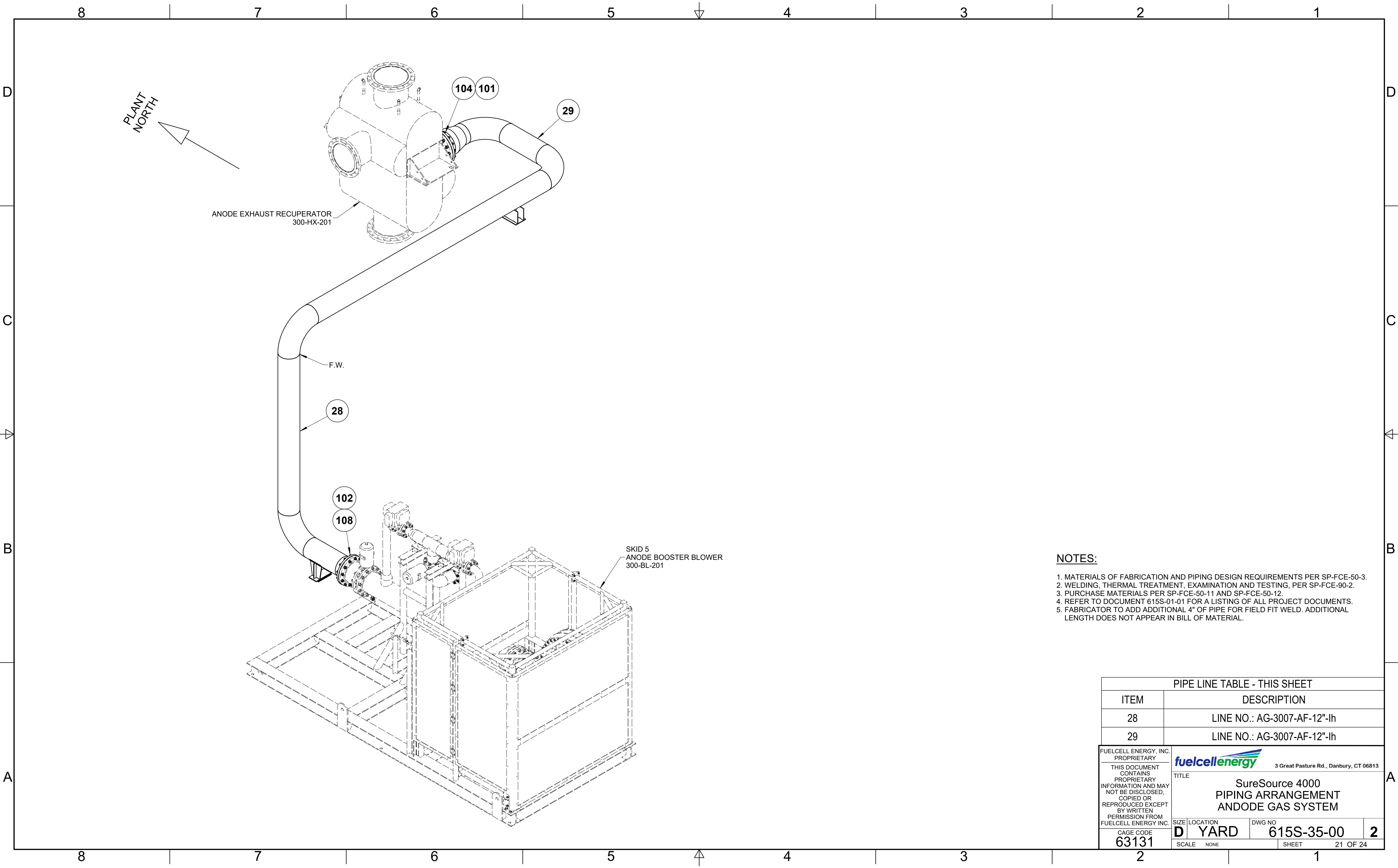


**NOTES:**

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2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
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5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
30	LINE NO.: AG-3008-AF-16"-lh
31	LINE NO.: AG-3008-AF-16"-lh
37	LINE NO.: AG-3015-AF-8"-lh
38	LINE NO.: AG-3015-AF-8"-lh
39	LINE NO.: AG-3016-AF-8"-lh
40	LINE NO.: AG-3016-AF-8"-lh

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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          ANODE GAS SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NONE	SHEET 20 OF 24	




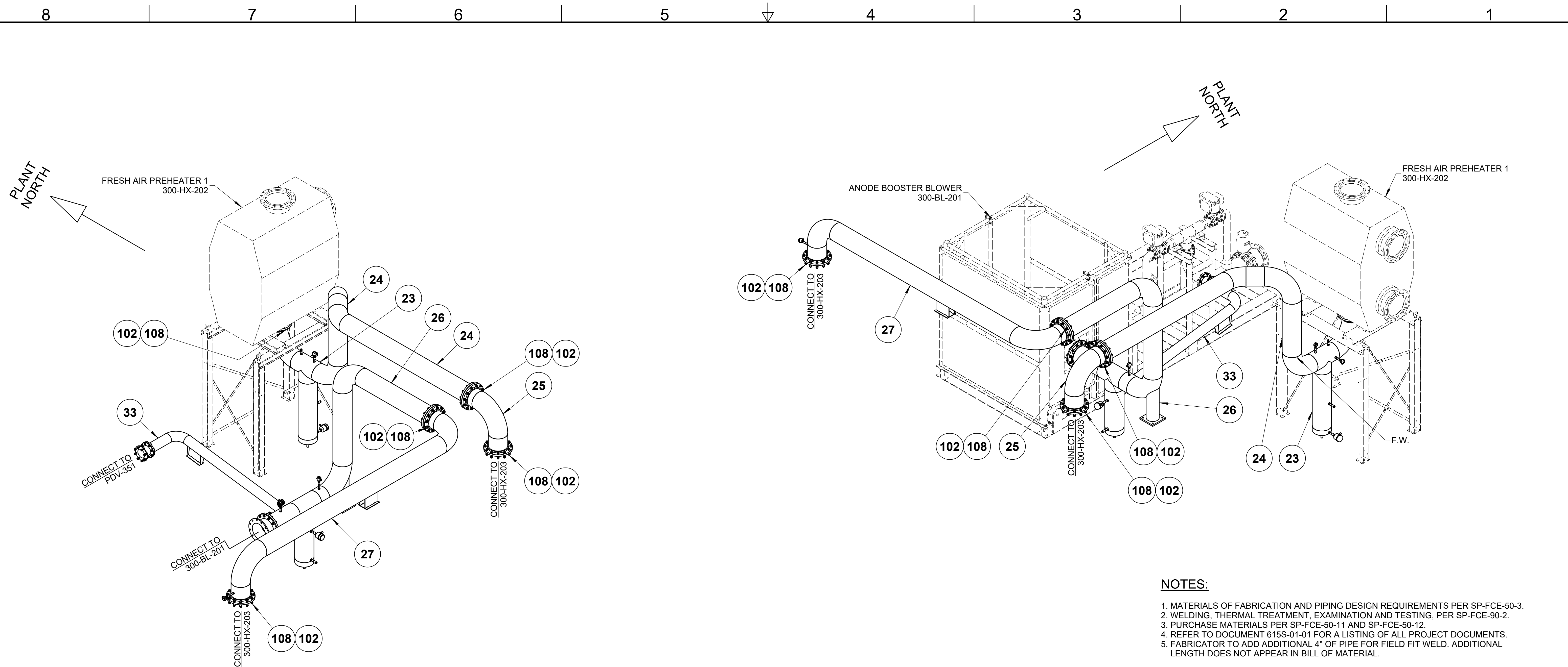
**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
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5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
28	LINE NO.: AG-3007-AF-12"-lh		
29	LINE NO.: AG-3007-AF-12"-lh		


  

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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          ANODE GAS SYSTEM</b>		
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>	SHEET <b>2</b>
SCALE NONE		SHEET 21 OF 24	



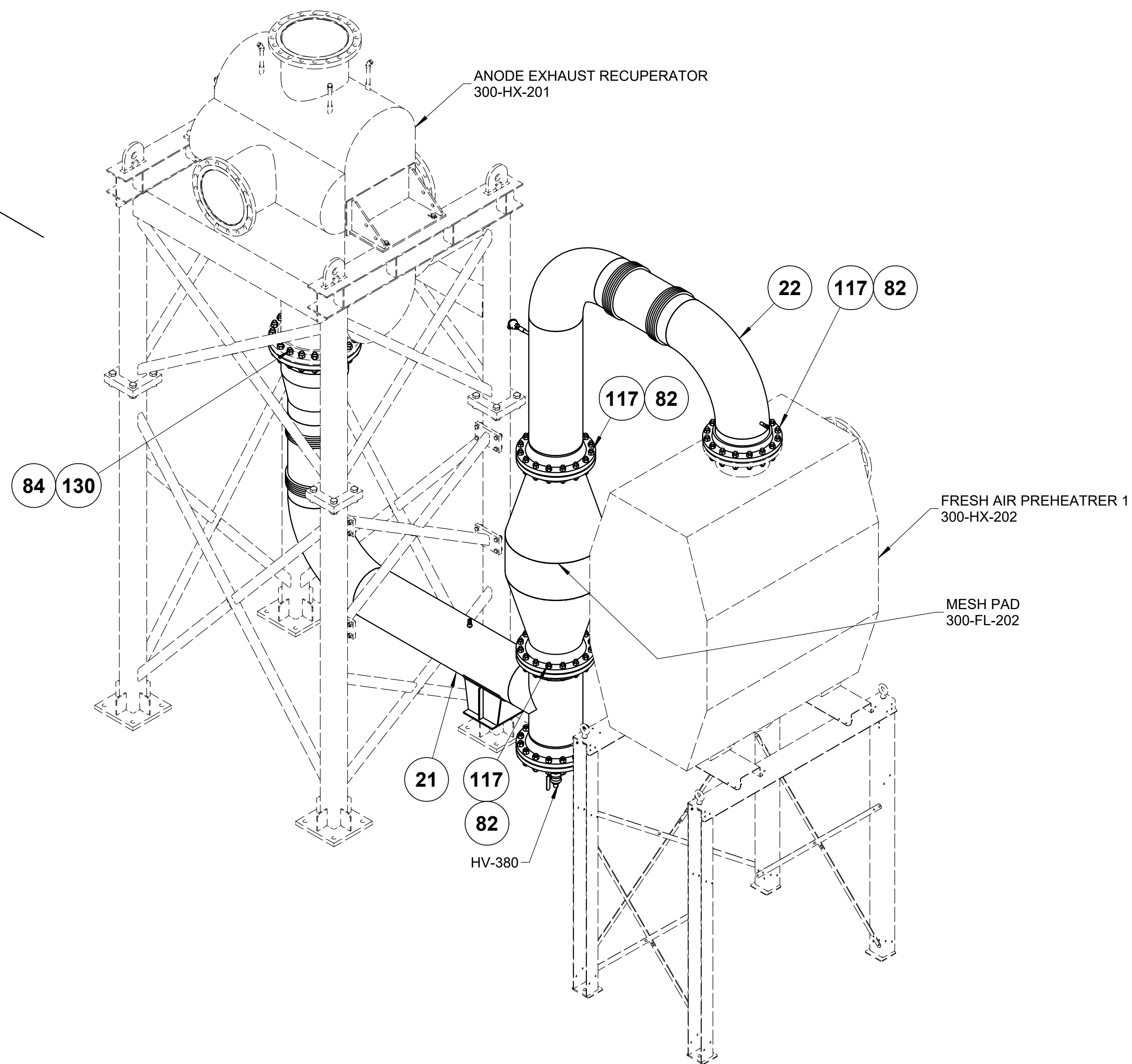
- NOTES:**
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET	
ITEM	DESCRIPTION
23	LINE NO.: AG-3005-AF-12"-lh
24	LINE NO.: AG-3005-AF-12"-lh
25	LINE NO.: AG-3005-AF-12"-lh
26	LINE NO.: AG-3006-AF-12"-lh
27	LINE NO.: AG-3006-AF-12"-lh
33	LINE NO.: AG-3010-AF-6"-lh

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	TITLE <b>SureSource 4000          PIPING ARRANGEMENT          ANODE GAS SYSTEM</b>	
CAGE CODE <b>63131</b>	SIZE LOCATION <b>D YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NONE	SHEET	<b>22 OF 24</b>



PLANT  
NORTH




**NOTES:**

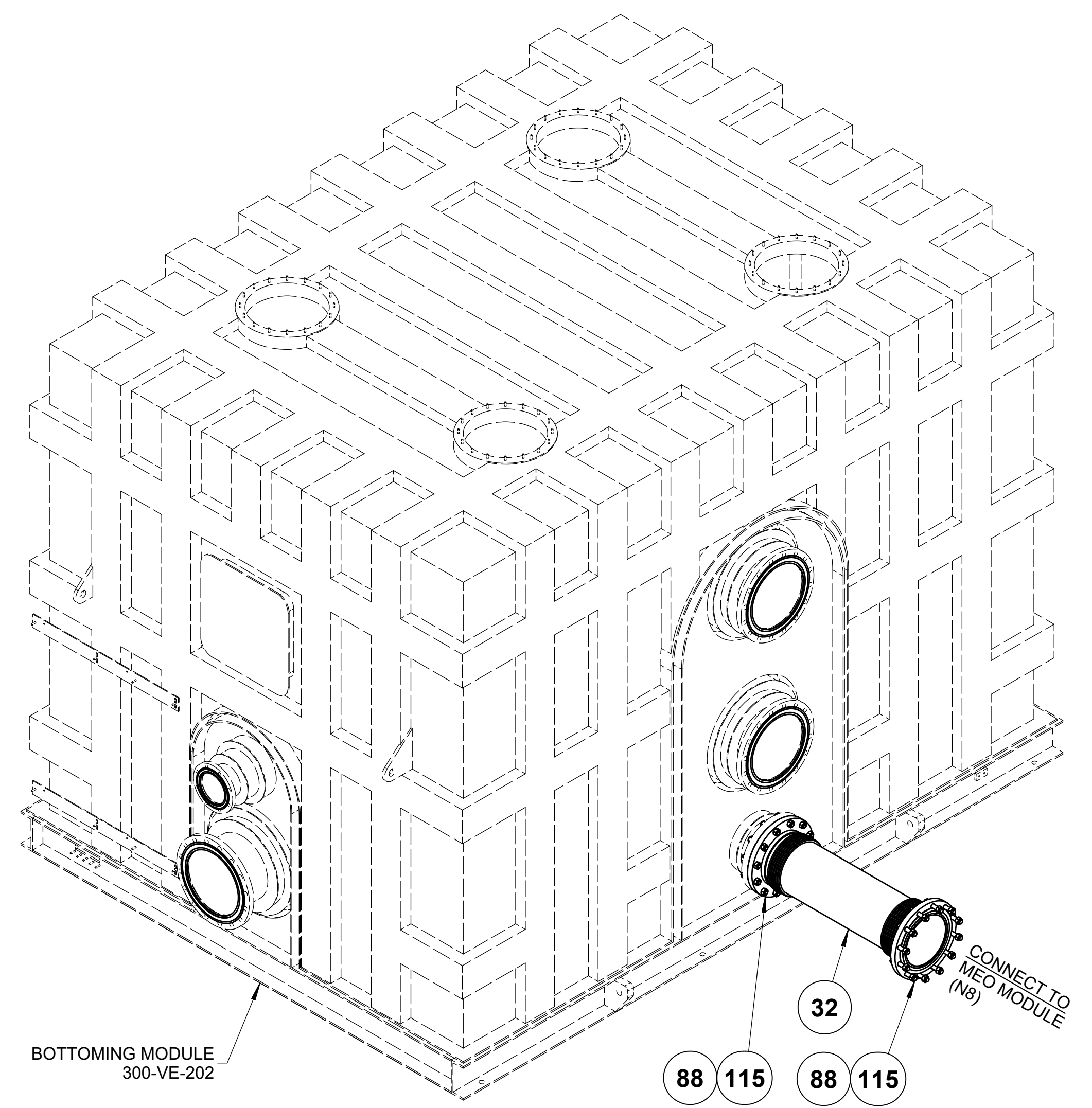
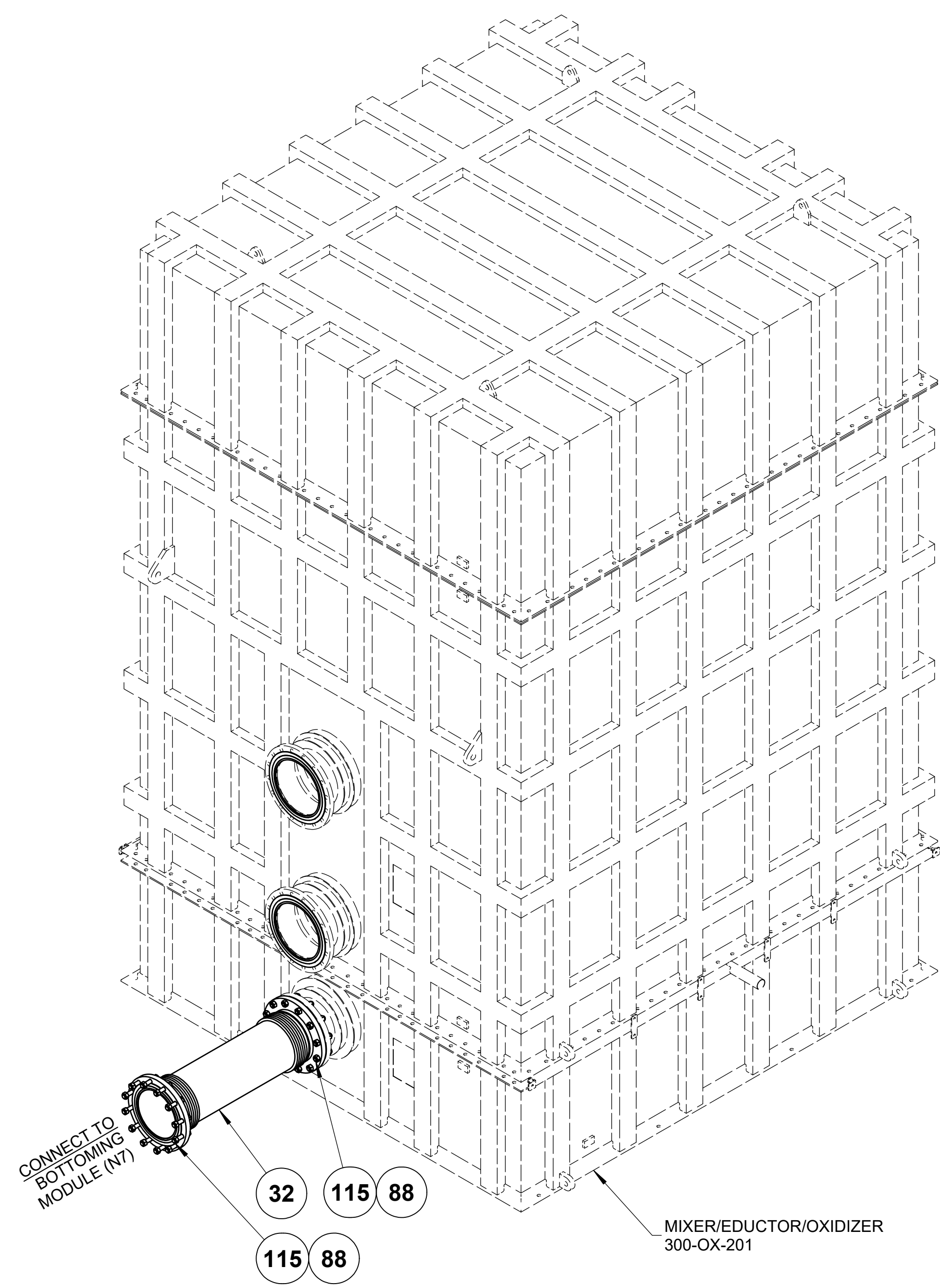
1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
21	LINE NO.: AG-3004-AF-16"-lh		
22	LINE NO.: AG-3004-AF-16"-lh		

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	<b>SureSource 4000          PIPING ARRANGEMENT          ANODE GAS SYSTEM</b>		
CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>YARD</b>	DWG NO <b>615S-35-00</b>
SCALE NONE	SHEET 23 OF 24		<b>2</b>

**RECEIVED**  
By TED HUIZINGA at 12:26 pm, Jun 29, 2017

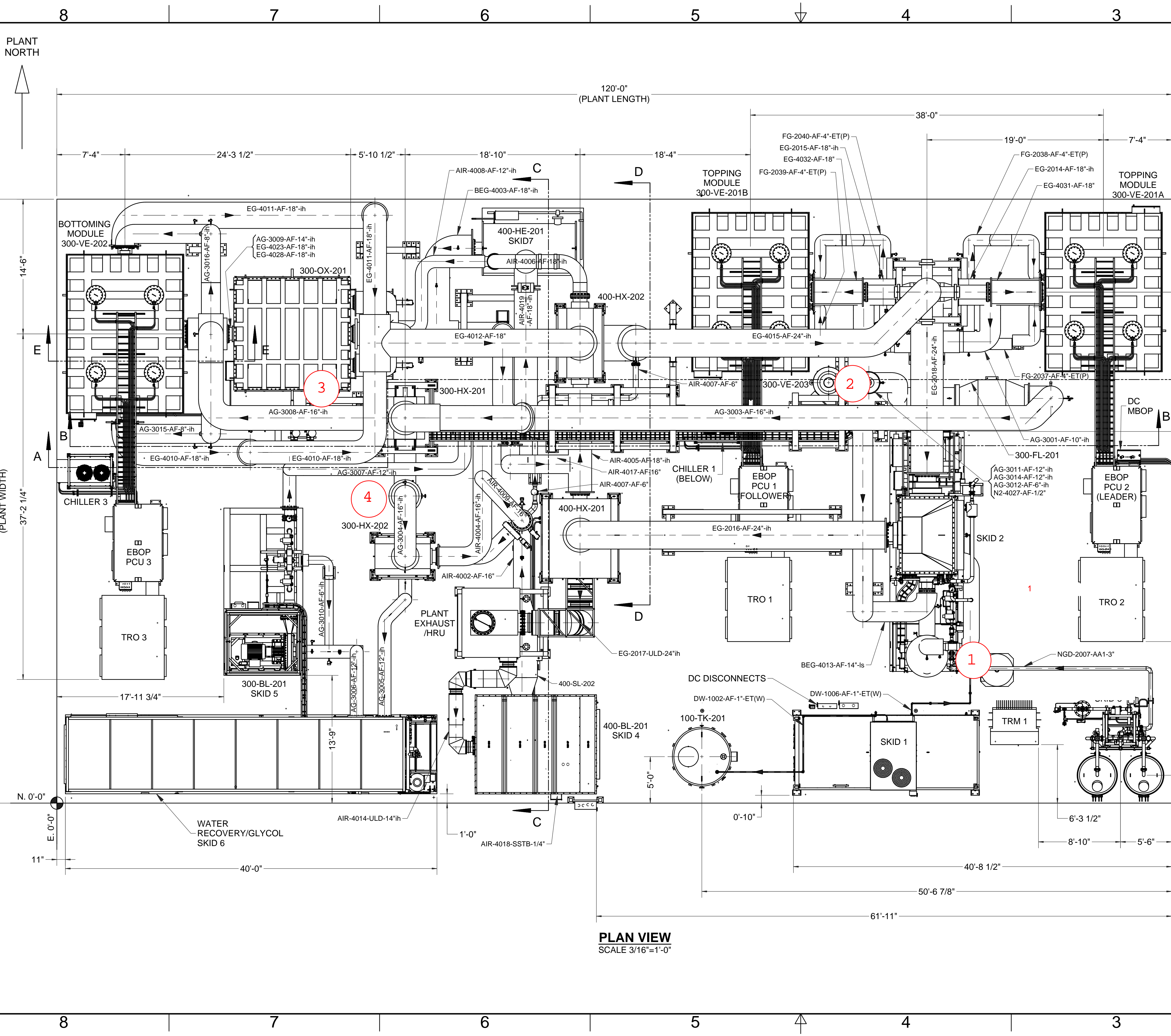


**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.

PIPE LINE TABLE - THIS SHEET			
ITEM	DESCRIPTION		
32	LINE NO.: AG-3009-AF-14"-lh		
<small>FUELCELL ENERGY, INC. PROPRIETARY</small> <small>THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.</small>			
<small>CAGE CODE</small> <b>63131</b>		<small>SIZE</small> <b>D</b>	<small>LOCATION</small> <b>YARD</b>
<small>DWG NO</small> <b>615S-35-00</b>		<small>SHEET</small> <b>24 OF 24</b>	

**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813  
**SureSource 4000**  
**PIPING ARRANGEMENT**  
**ANODE GAS SYSTEM**



REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
1	RELEASED PER INTERNAL REVIEW	MHB	D.GEORGE	06/24/16
2	REVISED PLANT LAYOUT	MHB	D.GEORGE	10/07/16
3	REVISED PLANT LAYOUT	MHB	D.GEORGE	01/02/17
4	REVISED PLANT LAYOUT	MHB	D.GEORGE	04/13/17
5	REVISED PLANT LAYOUT	KP	D.GEORGE	09/14/17

- NITROGEN ACTUATED VALVES**
1. N2 Supply (upstream of PCV-409)
  2. XV-440 Topping Module Purge
  3. XV-442 Bottoming Module Purge
  4. XV-352/356 Anode Recirc

**REFERENCE DRAWINGS:**

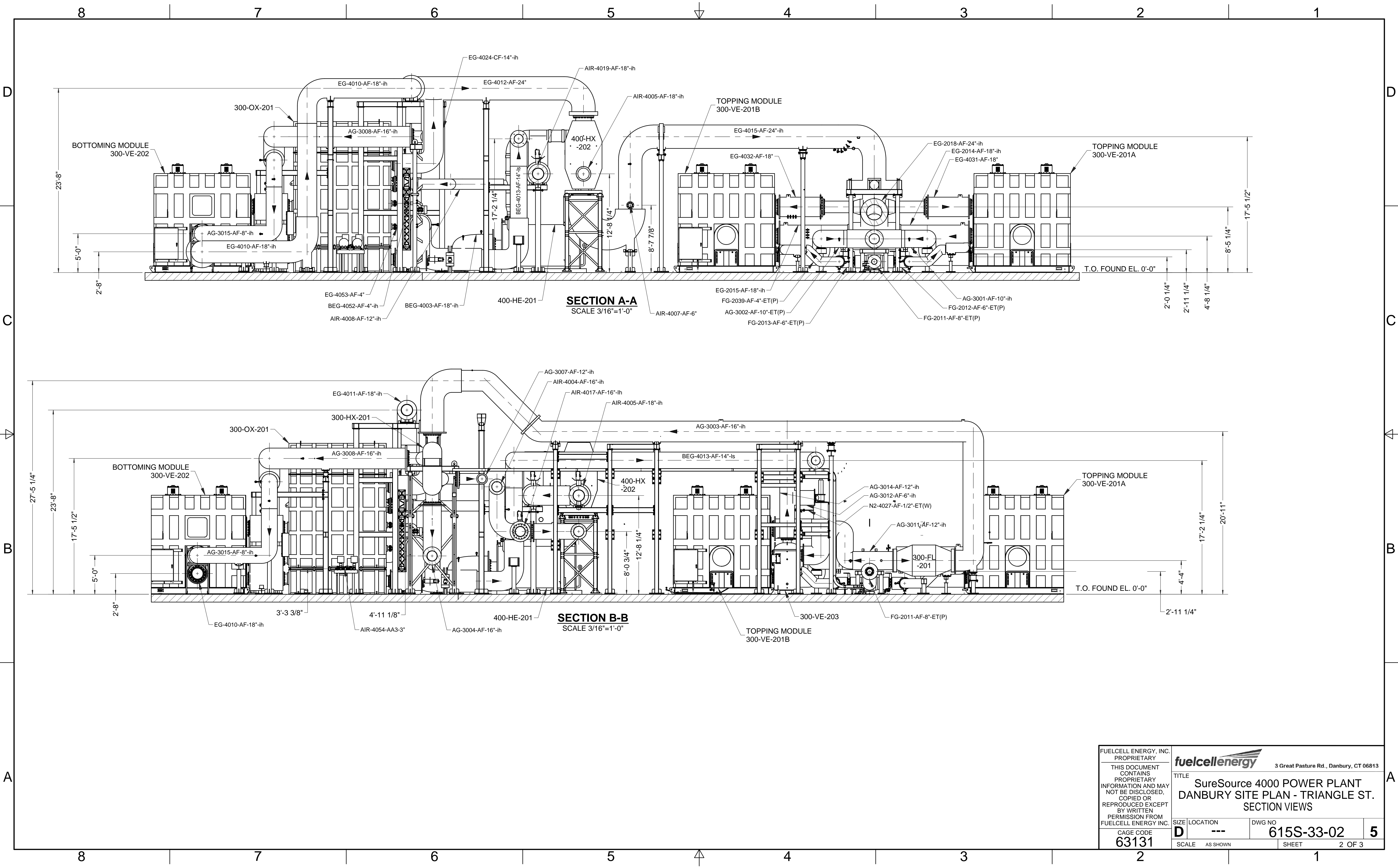
615S-01-01 - DRAWING LIST  
 615S-11-02 - LOCATION CONTROL PLAN - TRIANGLE STREET

**REFERENCE SHEETS - THIS DRAWING:**

SHEET 2 - SECTION VIEWS  
 SHEET 3 - SECTION VIEWS

**PLAN VIEW**  
 SCALE 3/16"=1'-0"

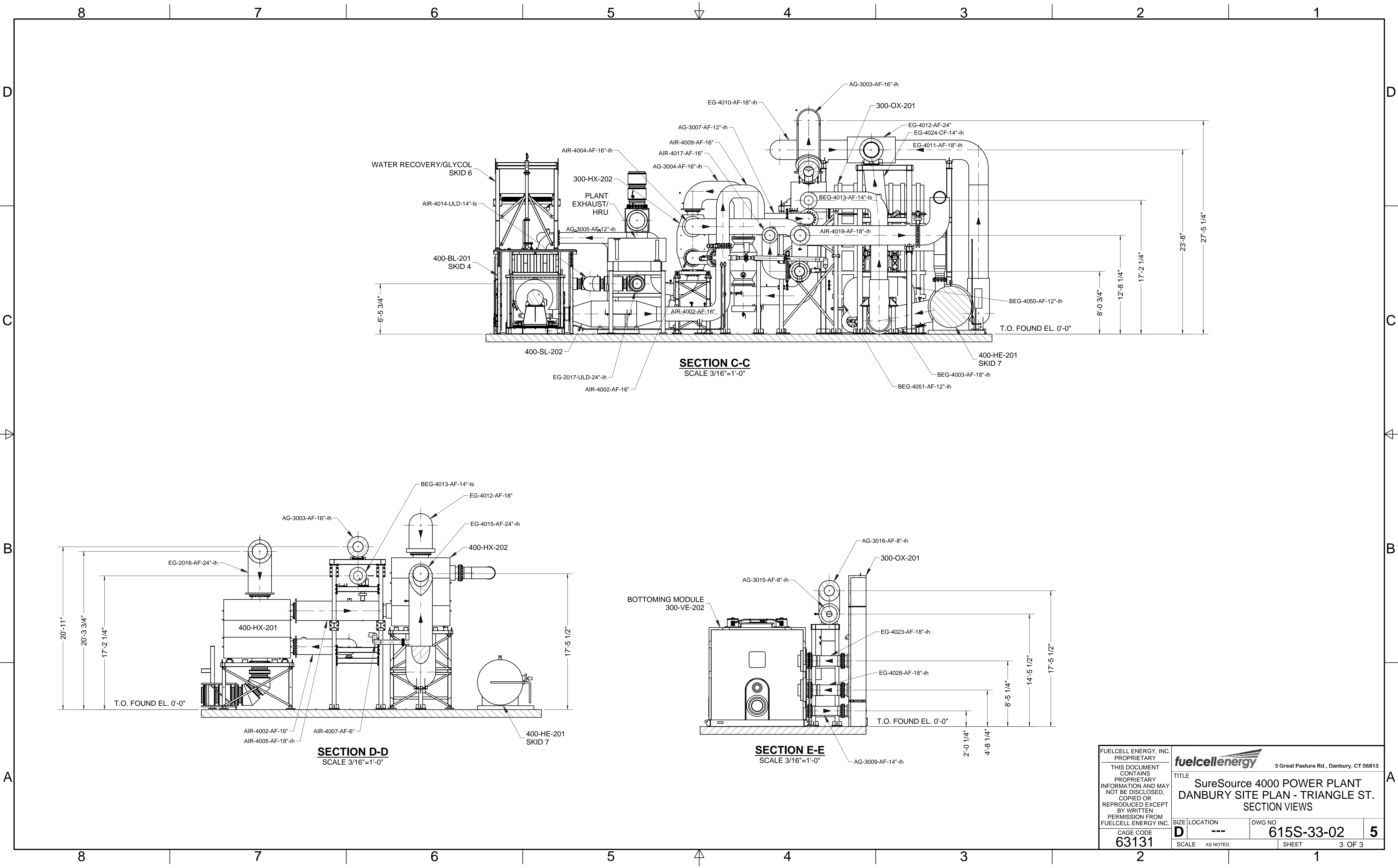
FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC. CAGE CODE <b>63131</b>	DRAWN: <b>M.BAUMANN</b> 06/24/16	3 Great Pasture Rd., Danbury, CT 06813	TITLE <b>SureSource 4000 POWER PLANT          DANBURY SITE PLAN - TRIANGLE ST.          OVERALL PLANT VIEWS</b>
	ENGINEER: <b>D.GEORGE</b> 06/24/16		APPROVED: <b>A.BARLOW</b> 06/24/16
	RELEASED: <b>A.HADJIST</b> 06/24/16		UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"
	REVISION INDICATOR <b>D</b>		DWG NO <b>615S-33-02</b>
FLAG NOTE	SCALE AS NOTED	LOCATION ---	SHEET 1 OF 3



**SECTION A-A**  
SCALE 3/16"=1'-0"

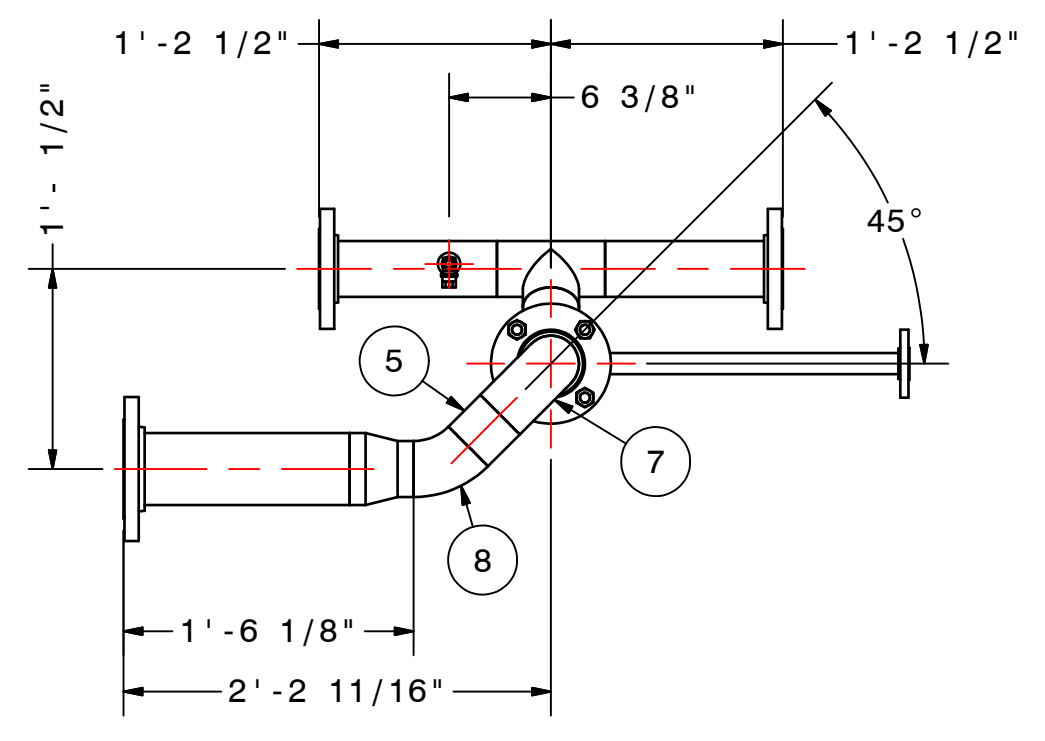
**SECTION B-B**  
SCALE 3/16"=1'-0"

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<b>TITLE</b> SureSource 4000 POWER PLANT DANBURY SITE PLAN - TRIANGLE ST. SECTION VIEWS					
<b>CAGE CODE</b> 63131		<b>SIZE</b> LOCATION D ---		<b>DWG NO</b> 615S-33-02	
<b>SHEET</b> 2 OF 3		<b>5</b>			

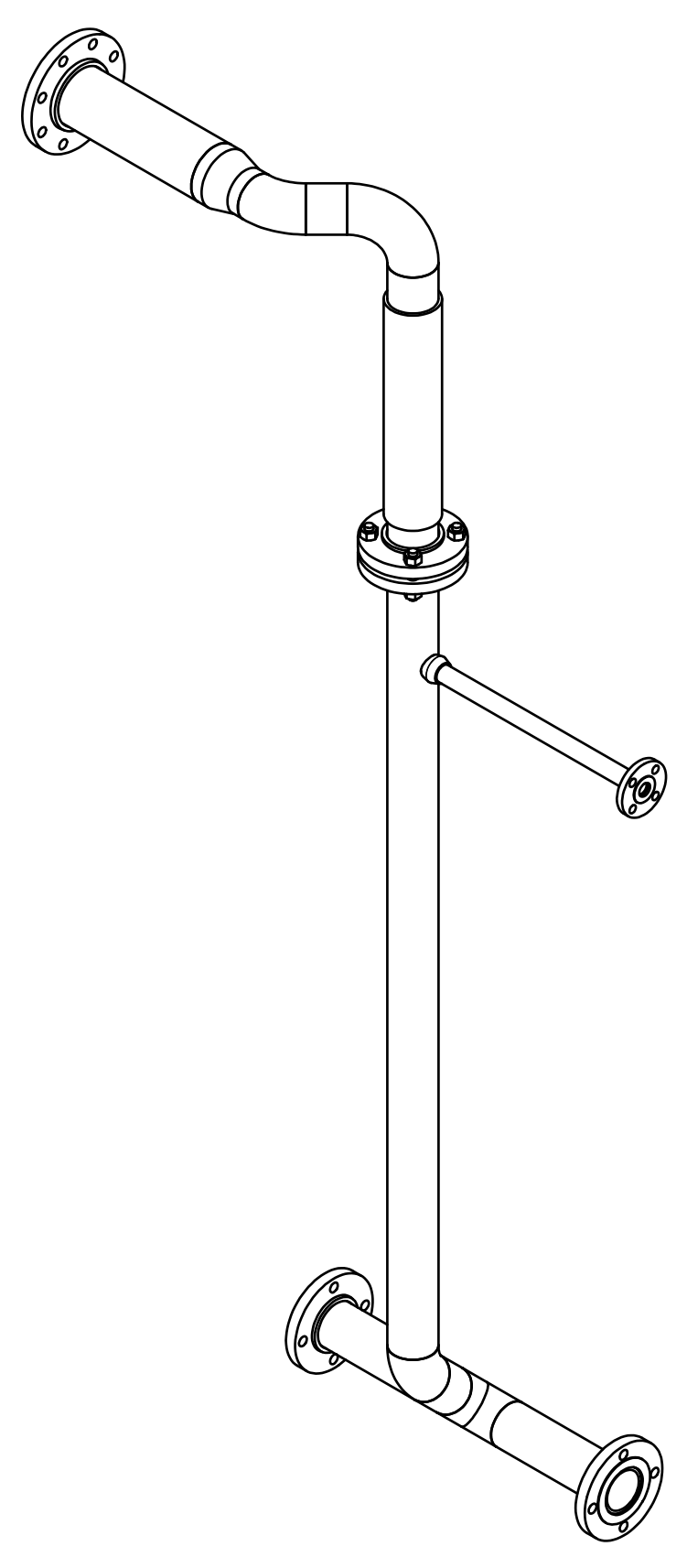


FUELCELL ENERGY, INC. PROPRIETARY				3 Great Pasture Rd., Danbury, CT 06813	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.					
TITLE		SureSource 4000 POWER PLANT DANBURY SITE PLAN - TRIANGLE ST. SECTION VIEWS			
SIZE	LOCATION	DWG NO	5		
D	---	615S-33-02		3 OF 3	
SCALE	AS NOTED	SHEET			

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1307	KP	A.BARLOW	3/2/2018
B	INCREASED DISTANCE BETWEEN HV-235 & FE-217 PER ECO1298, CORRECTED ITEM 8 ON 2007-B	KGG	A.BARLOW	4/6/2018
C	ADDED PIPE & FGL FOR 2042 CONNECTION PER ECO #1309	KGG	A.BARLOW	6/5/2018



TOP VIEW  
SCALE 1"=1'-0"

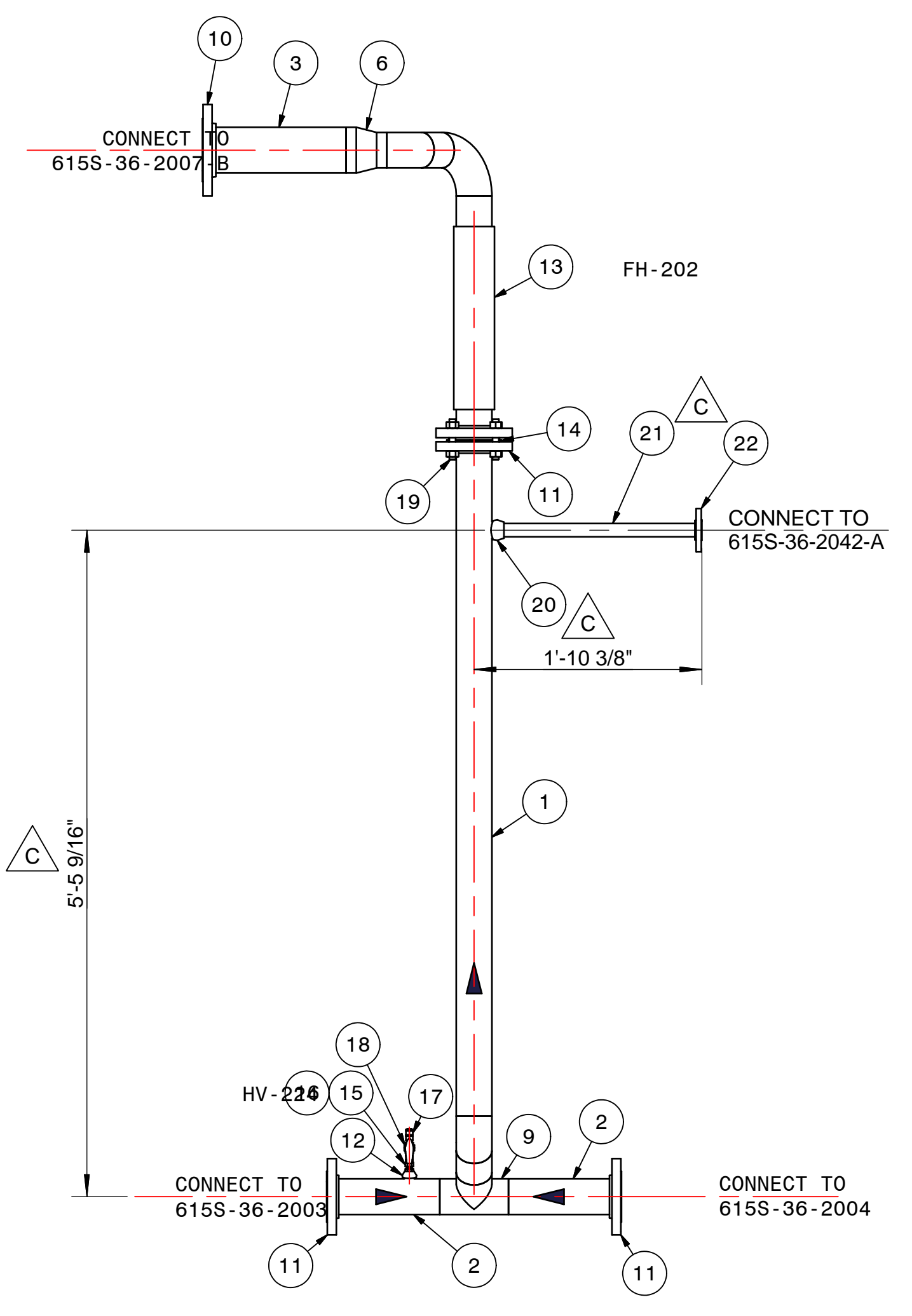


ISOMETRIC VIEW  
SCALE: N.T.S.

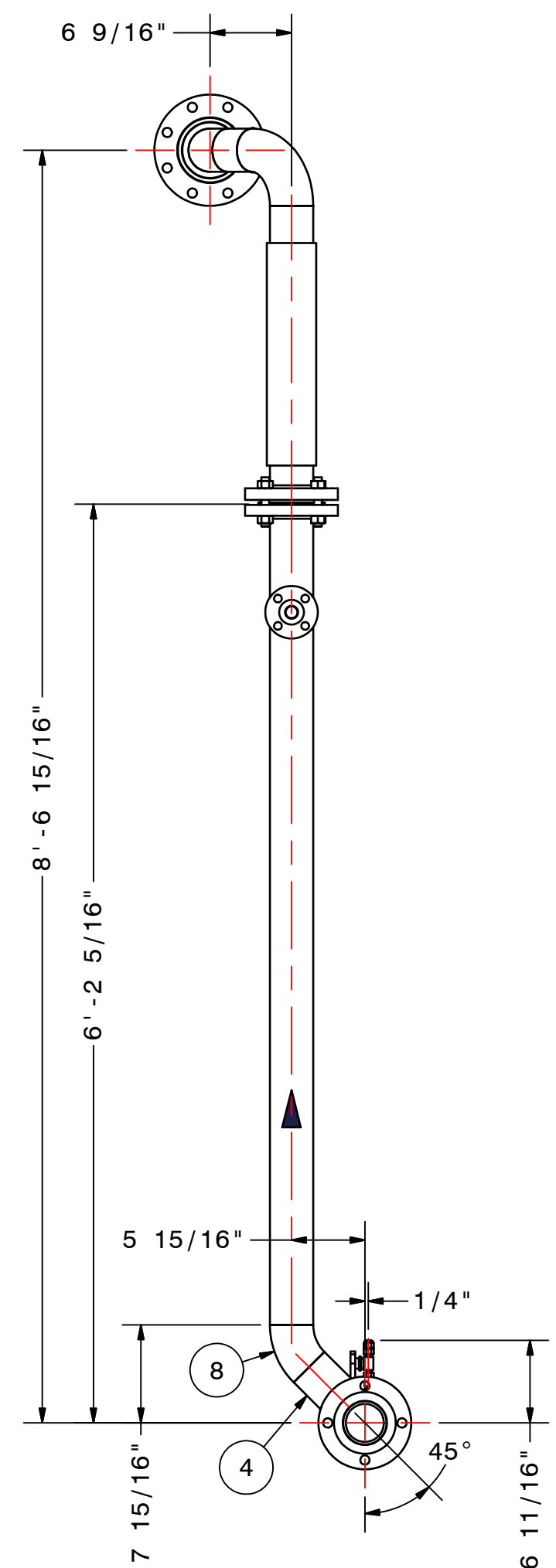
- NOTES:
- MATERIALS OF FABRICATION PER SP-FCE-50-3.
  - WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  - PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  - REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  - FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIALS.

PART NUMBER: 615S-36-2007-A

LIST OF MATERIALS				
ITEM	PART NUMBER	TOTAL QTY	DESCRIPTION	MATERIAL
1	4527-010	5.52 ft	3" PIPE STD WT ERW/A53B	ASTM A53B
2	4527-010	1.83 ft	3" PIPE STD WT ERW/A53B	ASTM A53B
3	4527-011	1.10 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B
4	4527-010	0.25 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
5	4527-010	0.23 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
6	4569-011-010	1	REDUCER, CON, STD WT, SMLS, 4" x 3"	ASTM A234WPB
7	4545-010	1	ELL 90 DEG LR STD WT SMLS 3"	ASTM A234WPB
8	4535-010	2	ELL 45 DEG LR STD WT SMLS 3"	ASTM A234WPB
9	4562-010	1	TEE, EQUAL, STD WT, SMLS, 3"	ASTM A234WPB
10	4637-011	1	FLG, SO, 150# RF, 4"	ASTM A105
11	4637-010	3	FLG, SO, 150# RF, 3"	ASTM A105
12	4633-010-002	1	SOCKOLET, 3000#, 3" x 3/8"	ASTM A105
13	20701-010	1	HOSE, BRD, 3", SS, 24" LG	AISI 304
14	8766-010	1	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 3"	
15	2984	1	MALE PIPE WLD CONNECTOR, 3/8 BE PIPE x 3/8 TUBE ENDS	AISI 316
16	2951	1	PORT CONNECTOR, TUBE STUB (Tx) x TUBE END	AISI 316
17	7826-002	1	PLU W/LANYARD, TUBE END	AISI 316
18	9208-002	1	BALL, TUBE ENDS, PTFE PKG, LIV LOAD SEAT	AISI 316
19	7567-101-064	4	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 5/8-11 UNC, 4" LNG	ASTM A193 GR. B7
20	4633-010-005	1	SOCKOLET, 3000#, 3" x 1"	ASTM A105
21	4524-005	1.63 ft	PIPE, SCH80, SMLS, 1"	ASTM A53B
22	4642-005	1	FLG, SW, 150# RF, 1"	ASTM A105



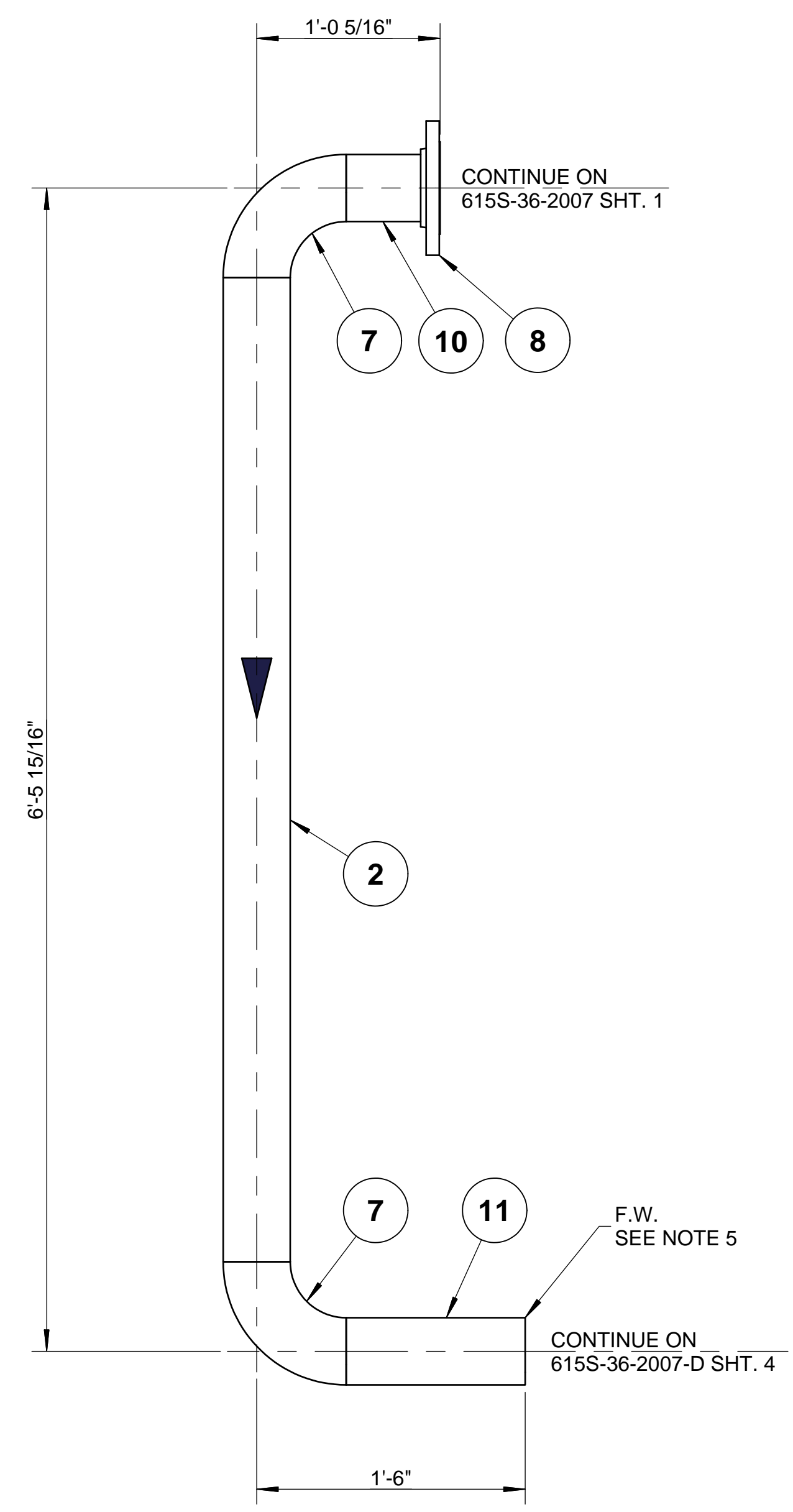
FRONT VIEW  
SCALE 1"=1'-0"



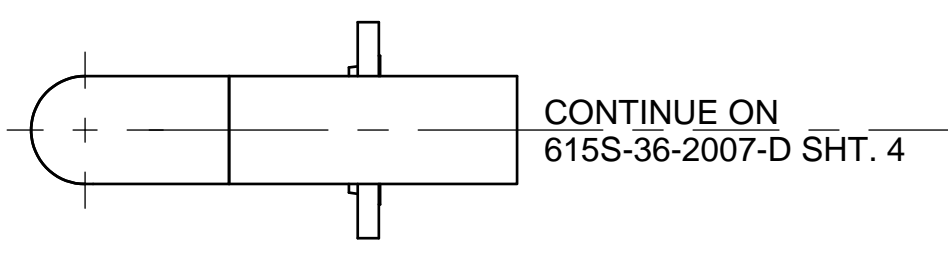
SIDE VIEW  
SCALE 1"=1'-0"

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	DRAWN: K.PERSICO 1/29/18	TITLE SureSource 4000 PIPING ASSEMBLY LINE NO.: NGD-2007-AA1-3"		
	ENGINEER: D.GEORGE 1/29/18	APPROVED: A.BARLOW 1/29/18		
	RELEASED: P.BEAUDOIN 1/29/18	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"		
CAGE CODE 63131	REVISION INDICATOR FLAG NOTE	SIZE LOCATION D 24066	DWG NO 615S-36-2007	
		SCALE AS SHOWN	SHEET 1 OF 5	

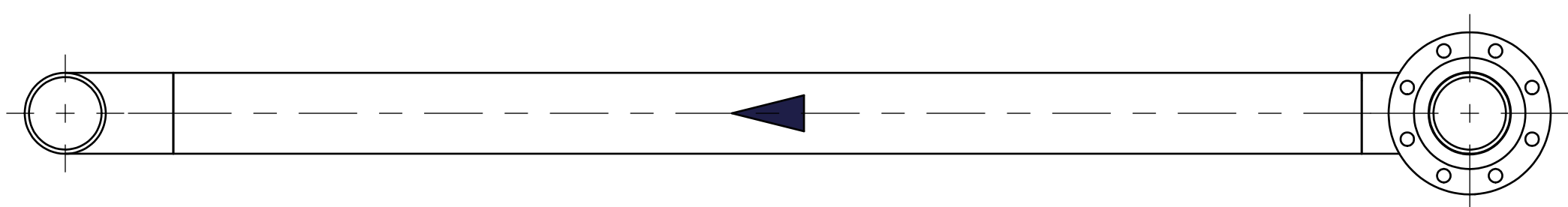
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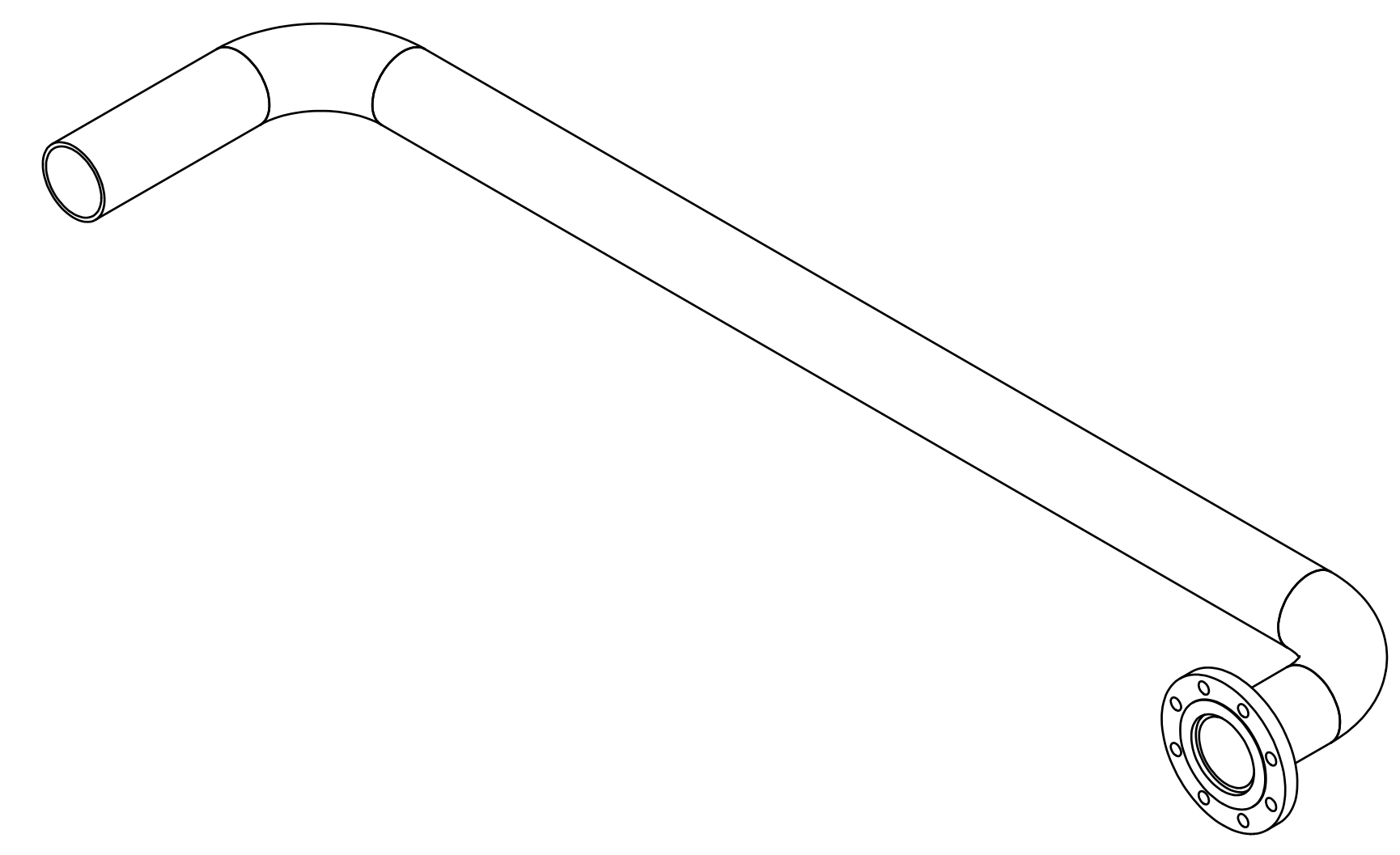
**TOP VIEW**  
SCALE 1 1/2"=1'-0"



**FRONT VIEW**  
SCALE 1 1/2"=1'-0"



**SIDE VIEW**  
SCALE 1 1/2"=1'-0"



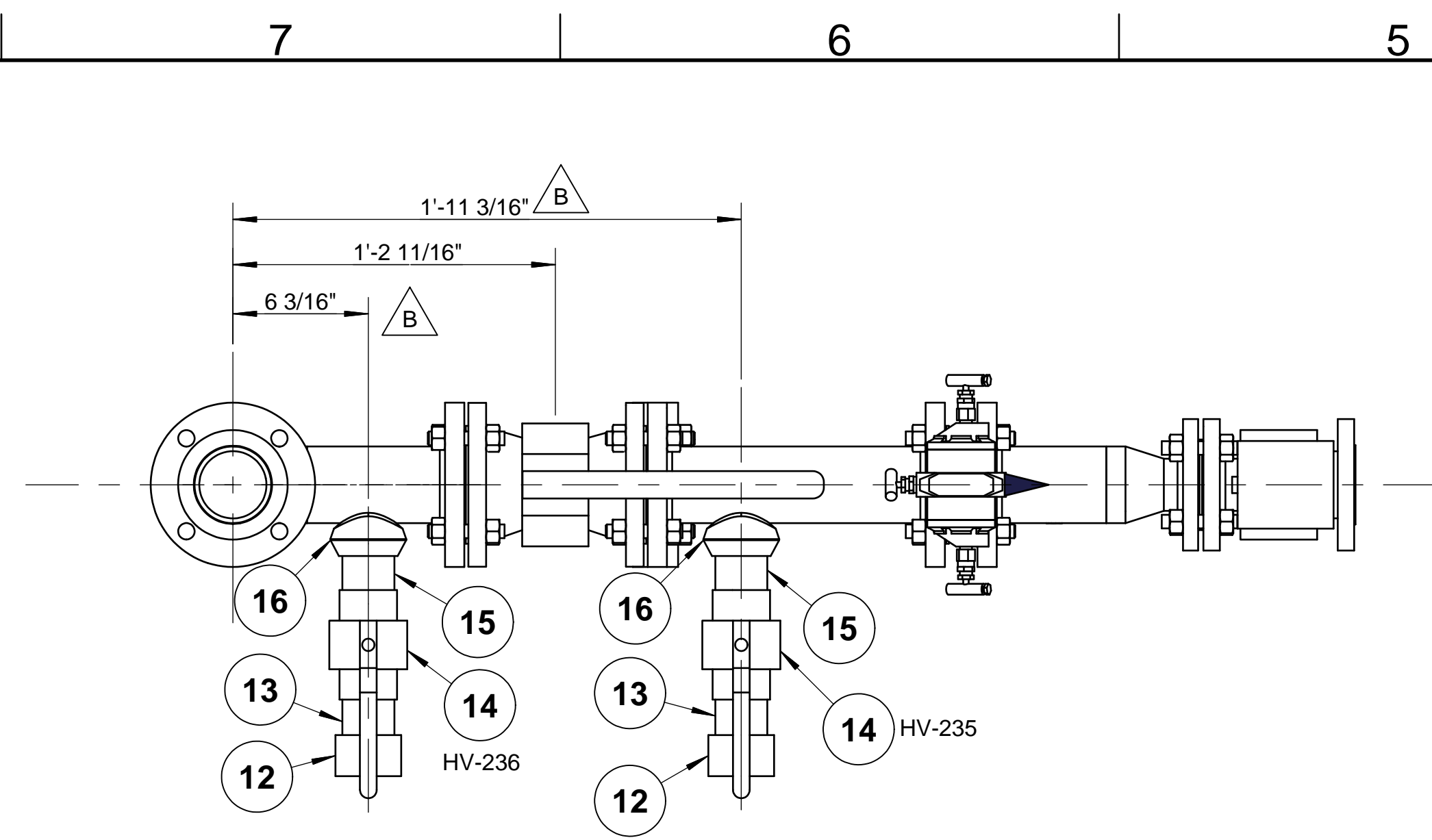
**ISOMETRIC VIEW**  
SCALE: N.T.S.

**PART NUMBER: 615S-36-2007-B**

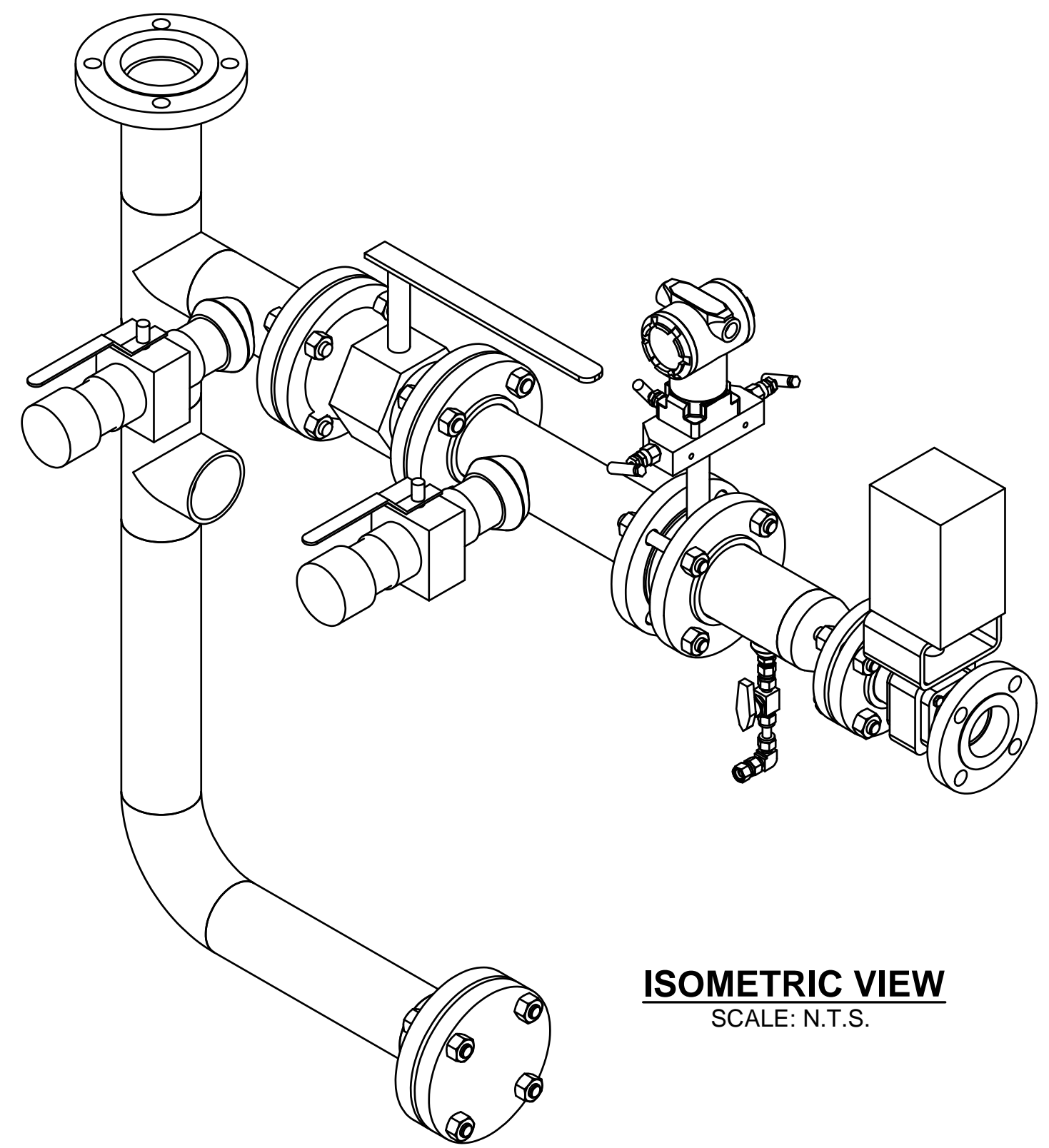
LIST OF MATERIALS				
ITEM	PART NUMBER	TOTAL QTY	DESCRIPTION	MATERIAL
2	4527-011	5.50 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B
7	4545-011	2	ELL 90 DEG LR STD WT SMLS 4"	ASTM A234WPB
8	4637-011	1	FLG, SO, 150# RF, 4"	ASTM A105
10	4527-011	0.50 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B
11	4527-011	1.00 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B

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	<b>TITLE</b> SureSource 4000 PIPING ASSEMBLY LINE No.: NGD-2007-AA1-4"		
CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>24097</b>	DWG NO <b>615S-36-2007</b>
SCALE AS NOTED	SHEET 2 OF 5	SHEET 2 OF 5	SHEET 2 OF 5

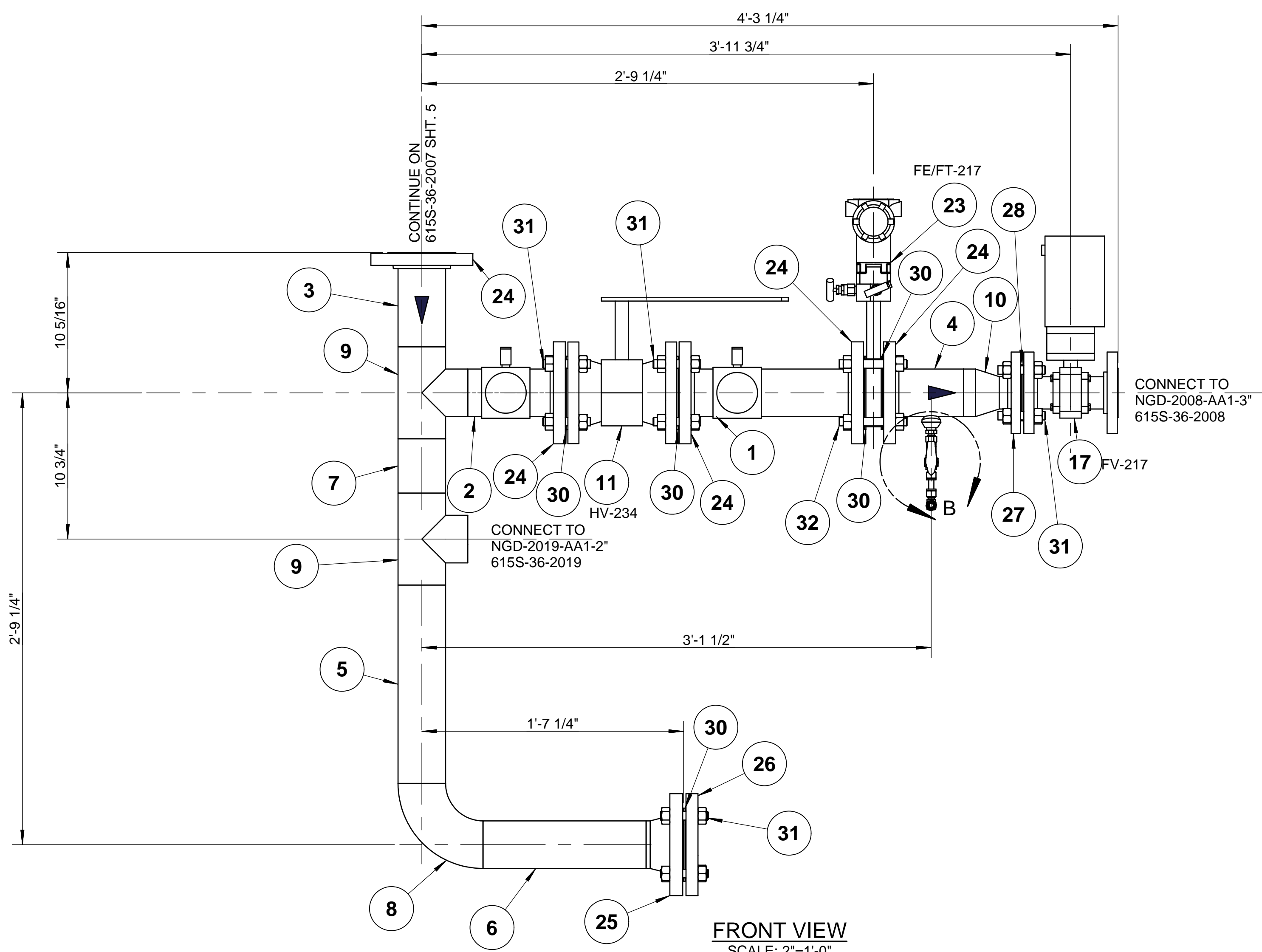
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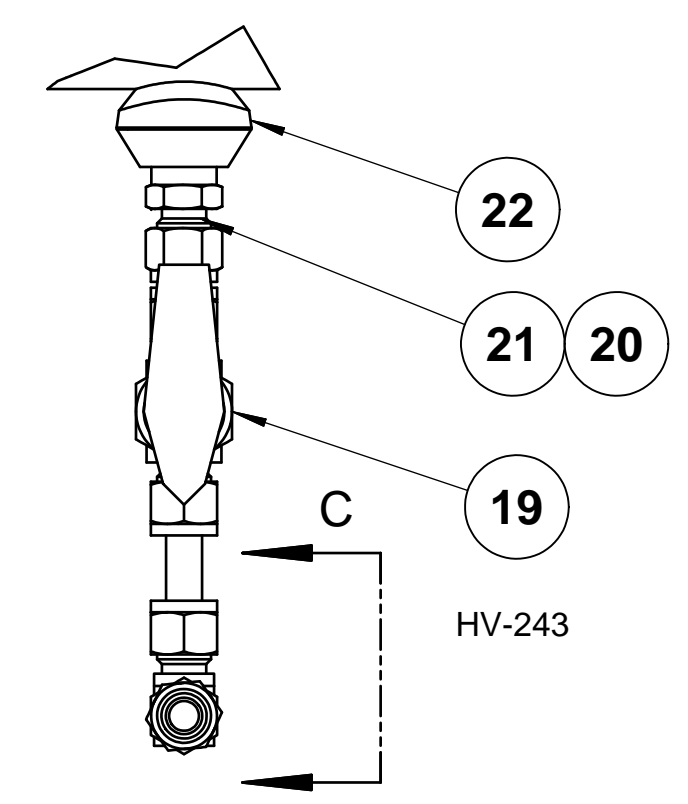
**TOP VIEW**  
SCALE: 3"=1'-0"



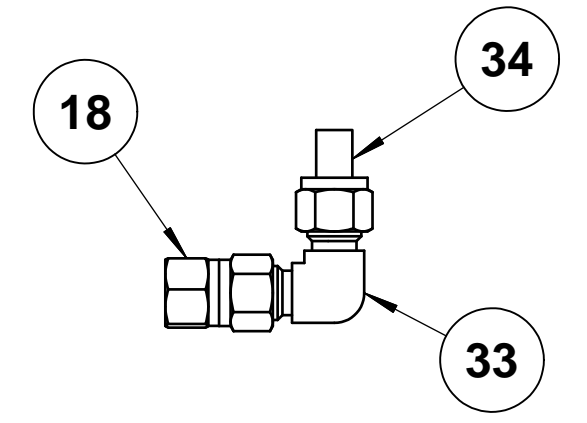
**ISOMETRIC VIEW**  
SCALE: N.T.S.



**FRONT VIEW**  
SCALE: 2"=1'-0"



**DETAIL B**  
SCALE 6" = 1'-0"



**DETAIL C-C**  
SCALE 6" = 1'-0"

**PART NUMBER: 615S-36-2007-C**

LIST OF MATERIALS				
ITEM	PART NUMBER	TOTAL QTY	DESCRIPTION	MATERIAL
1	4527-010	0.98 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
2	4527-010	0.52 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
3	4527-010	0.50 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
4	4527-010	0.42 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
5	4527-010	1.22 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
6	4527-010	1.00 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
7	4527-010	0.33 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
8	4545-010	1	ELL 90 DEG LR STD WT SMLS 3"	ASTM A234WPB
9	4562-010	2	TEE, EQUAL, STD WT, SMLS, 3"	ASTM A234WPB
10	4569-010-008	1	REDUCER, CON, STD WT, SMLS, 3" x 2"	ASTM A234WPB
11	4421-013	1	BALL 150# RF CS, FT, 3"	Steel, Carbon
12	4579-008	2	CAP, 3000#, SCR, 2"	ASTM A105
13	4599-008	2	NIPPLE, SCH80, SMLS, TOE, 2"	ASTM A106B
14	4420-006	2	VALVE, BALL, 600#, SW, CS, 2	Steel, Carbon
15	4597-008	2	NIPPLE, SCH80, SMLS, PBE, 2"	ASTM A106B
16	4633-010-008	2	SOCKOLET, 3000#, 3" x 2"	ASTM A105
17	8283-003	1	VALVE, ASSEMBLY, 2", BALL, 96CV	
18	7826-002	1	PLU W/LANYARD, TUBE END	AISI 316
19	9208-002	1	BALL, TUBE ENDS, PTFE PKG, LIV LOAD SEAT	AISI 316
20	2951	1	PORT CONNECTOR, TUBE STUB (Tx) x TUBE END	AISI 316
21	2984	1	MALE PIPE WLD CONNECTOR, 3/8 BE PIPE x 3/8 TUBE ENDS	AISI 316
22	4633-010-002	1	SOCKOLET, 3000#, 3" x 3/8"	ASTM A105
23	21546-009	1	MFLOWMETER TRANS,3IN, 450SCFM	
24	4637-010	5	FLG, SO, 150# RF, 3"	ASTM A105
25	4647-010	1	FLG, WN, 150# RF, STD WT, 3"	ASTM A105
26	4654-010	1	FLG, BLIND, 150# RF, 3"	ASTM A105
27	4642-008	1	FLG, SW, 150# RF, 2"	ASTM A105
28	8766-008	1	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 2"	
30	8766-010	5	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 3"	
31	7567-101-056	16	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 5/8-11 UNC, 3.5" LNG	ASTM A193 GR. B7
32	7567-101-080	4	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 5/8-11 UNC, 5" LNG	ASTM A193 GR. B7
33	1750-006	1	ELBOW, 90 DEG, TUBE ENDS, 3/8	AISI 316
34	8744-002	0.167 ft	3/8" TUBE 0.049" WELDED, ANNEALED CD	ASTM A269TP316

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CAGE CODE  
**63131**

**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE  
**SureSource 4000 PIPING ASSEMBLY**  
LINE No.: NDG-2007-AA1-3"

SIZE	LOCATION	DWG NO
<b>D</b>	<b>24058</b>	<b>615S-36-2007</b>
SCALE	AS NOTED	SHEET
		<b>3 OF 5</b>



8 7 6 5 4 3 2 1

D

D

C

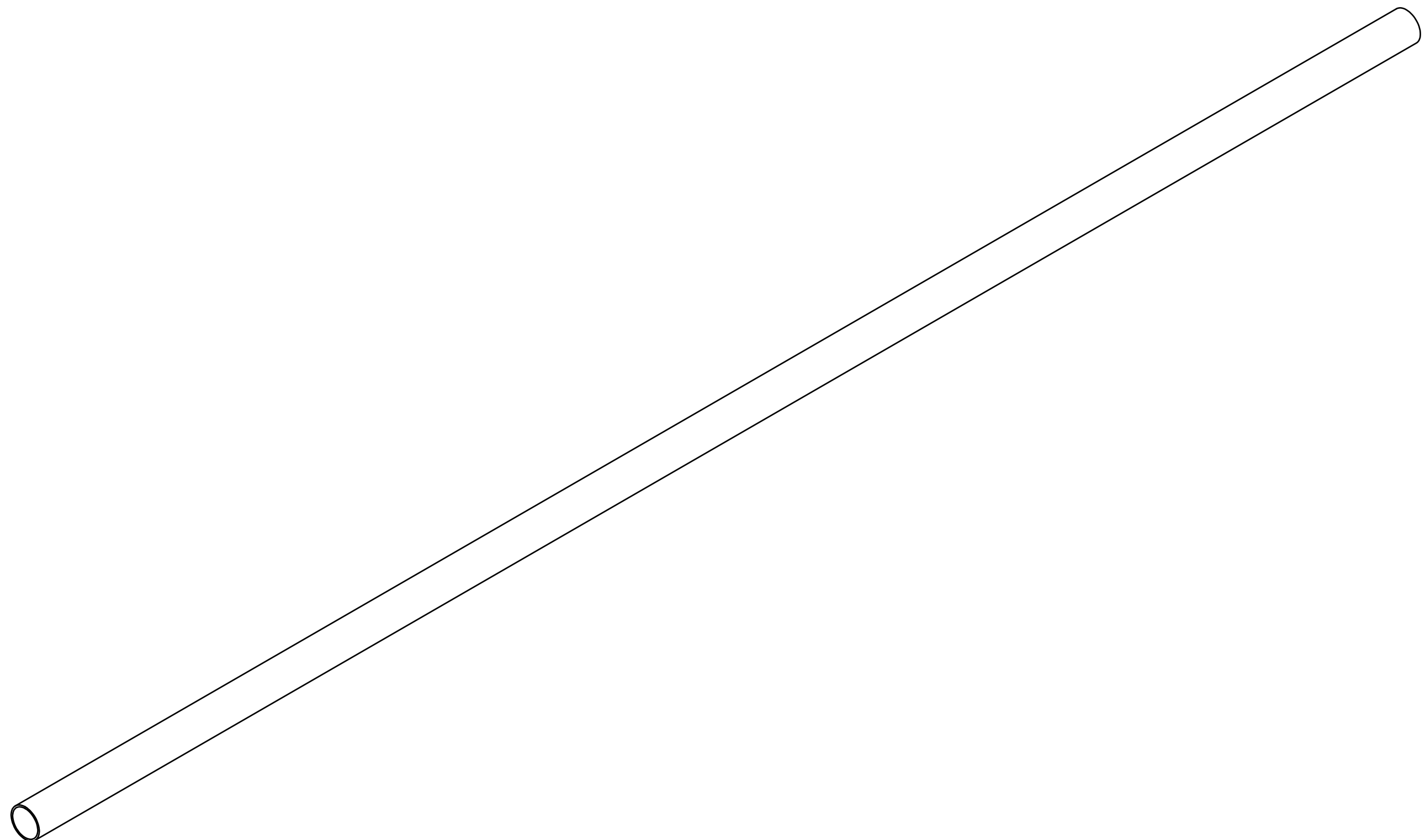
C

B

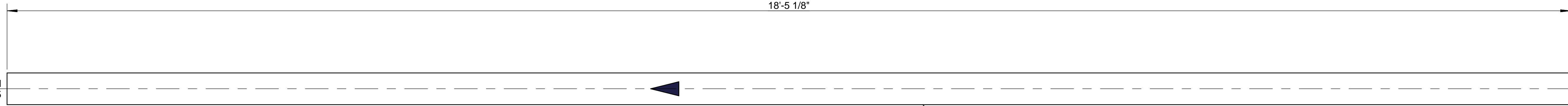
B

A

A



**ISOMETRIC VIEW**  
SCALE: N.T.S.



**FRONT VIEW**  
SCALE 1 1/2"=1'-0"

CONTINUE ON  
615S-36-2007-E SHT. 5

CONTINUE ON  
615S-36-2007-B SHT. 2

PART NUMBER: 615S-36-2007-D

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4527-011	18.42 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B

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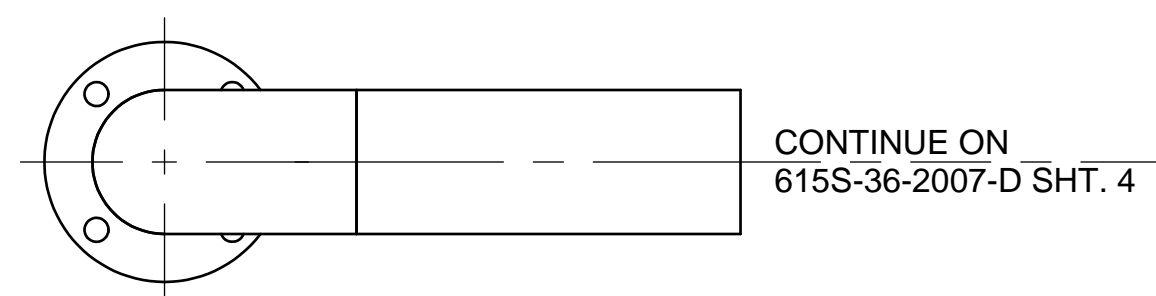
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO.: NGD-2007-AA1-4"**

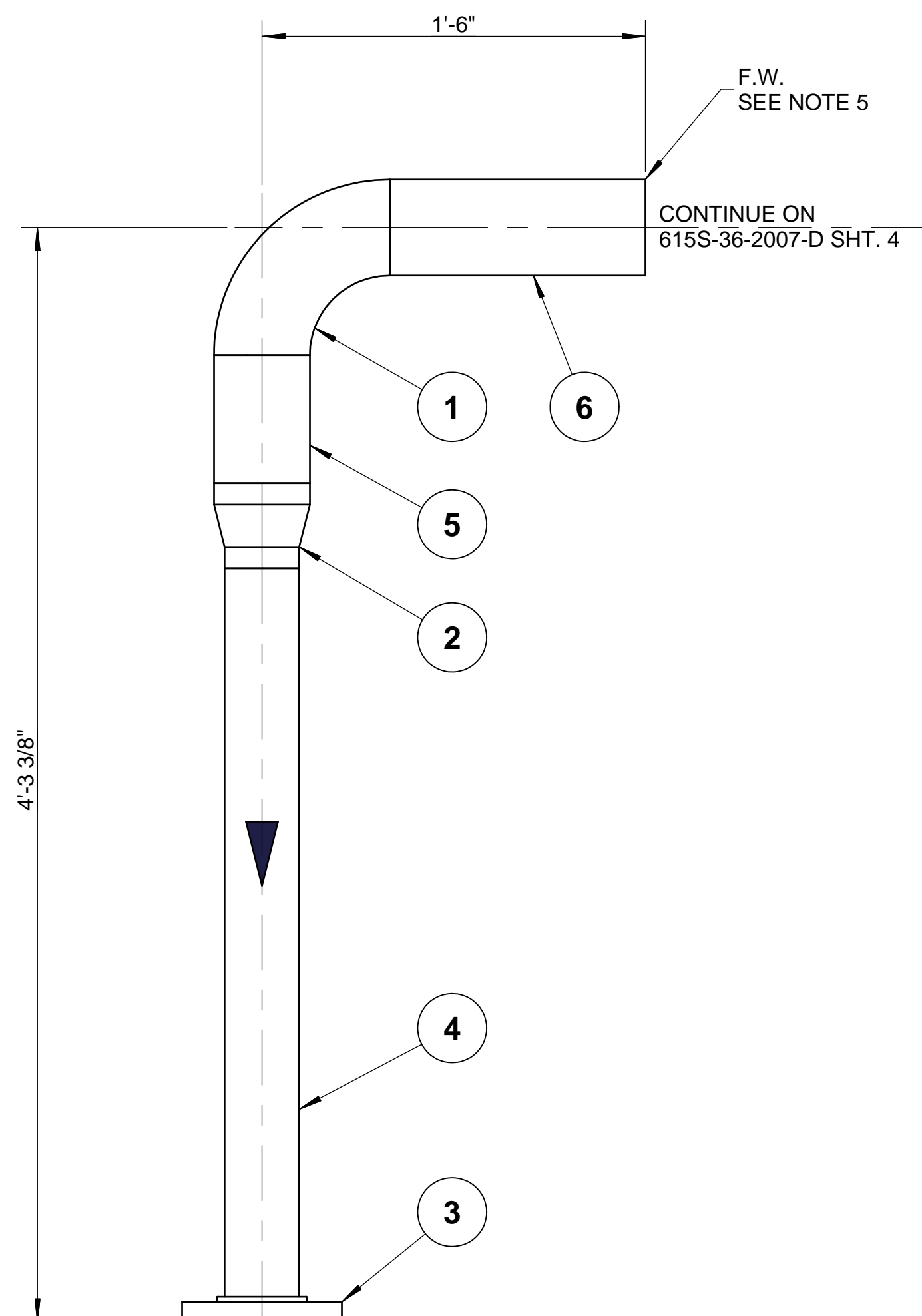
CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>24097</b>	DWG NO <b>615S-36-2007</b>	<b>C</b>
SCALE	AS NOTED	SHEET	4 OF 5	

8 7 6 5 4 3 2 1

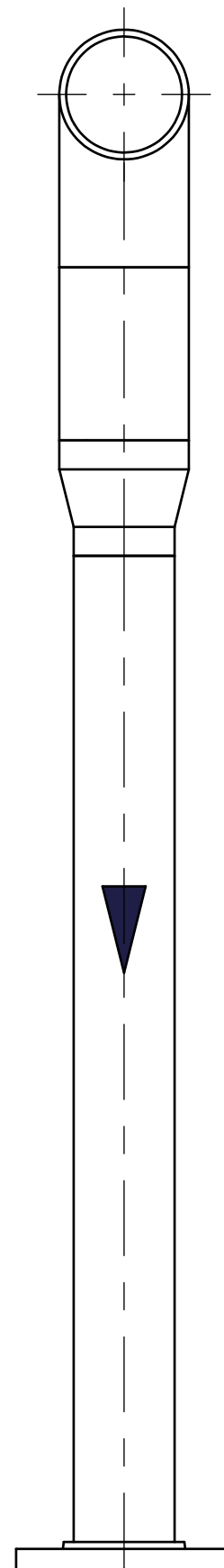
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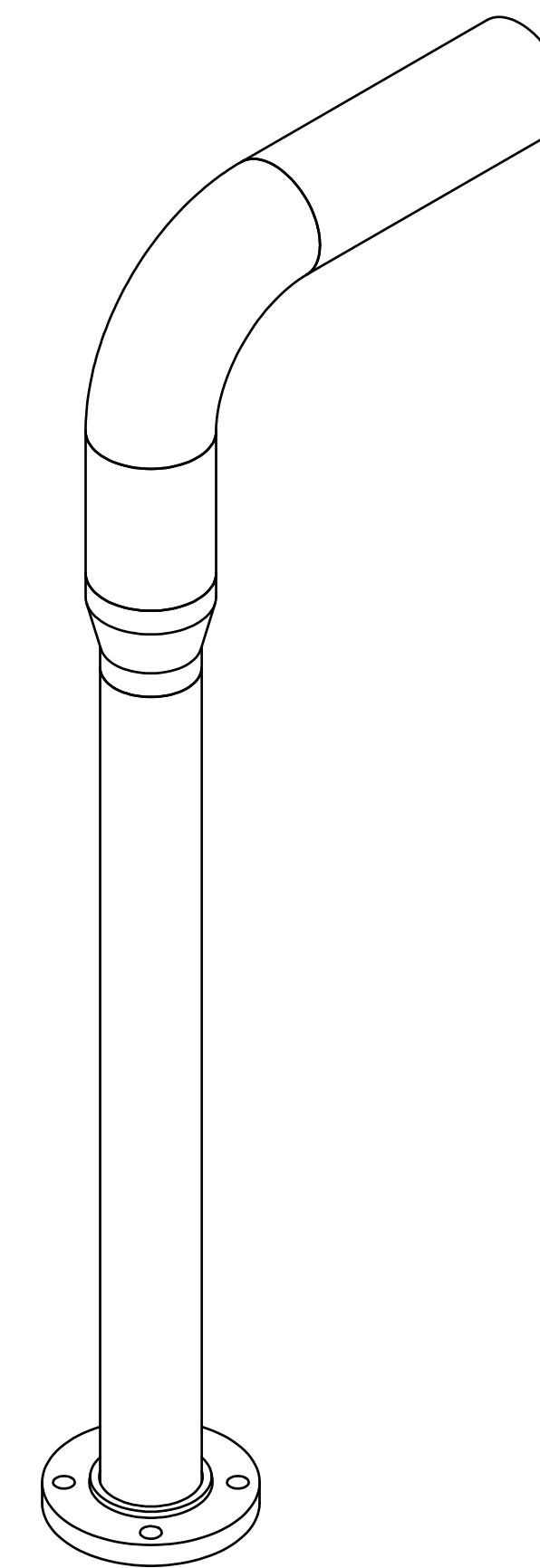
**TOP VIEW**  
SCALE 2"=1'-0"



**FRONT VIEW**  
SCALE 2"=1'-0"



**SIDE VIEW**  
SCALE 2"=1'-0"



**ISOMETRIC VIEW**  
SCALE: N.T.S.

PART NUMBER: 615S-36-2007-E

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4545-011	1	ELL 90 DEG LR STD WT SMLS 4"	ASTM A234WPB
2	4569-011-010	1	REDUCER, CON, STD WT, SMLS, 4" x 3"	ASTM A234WPB
3	4637-010	1	FLG, SO, 150# RF, 3"	ASTM A105
4	4527-010	2.92 ft	PIPE, STD WT, ERW/A53B, 3"	ASTM A53B
5	4527-011	0.50 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B
6	4527-011	1.00 ft	PIPE, STD WT, ERW/A53B, 4"	ASTM A53B

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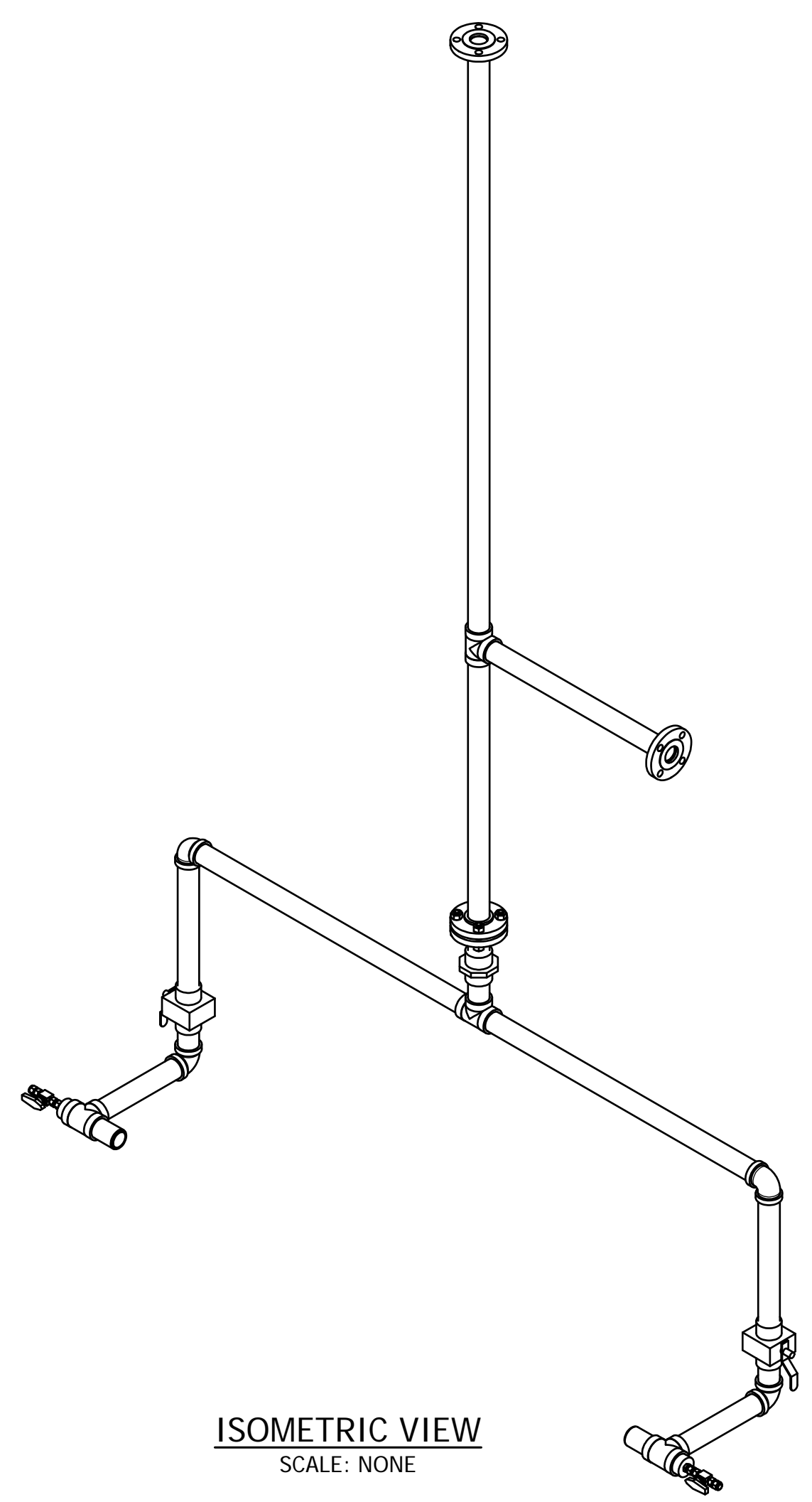
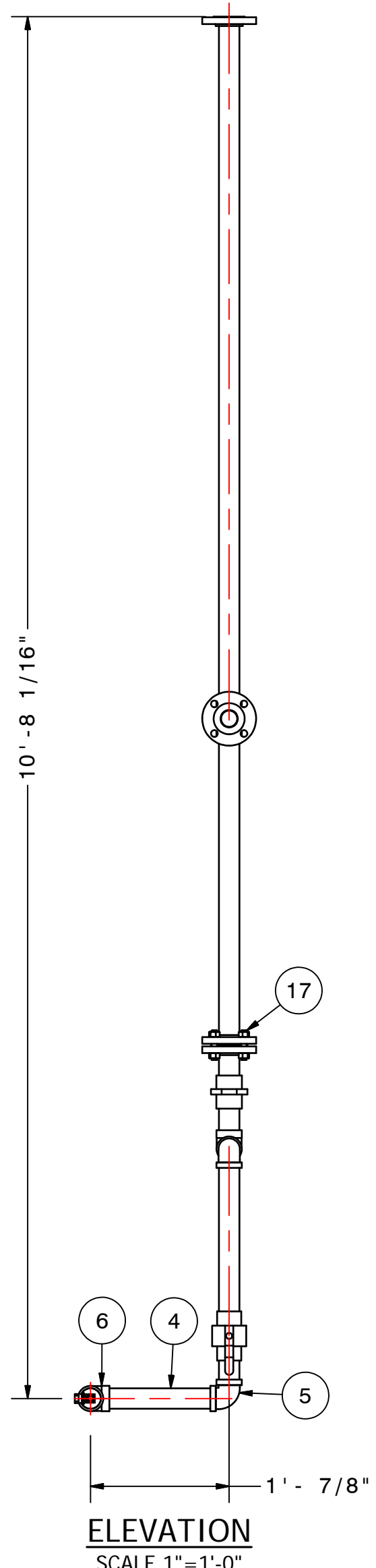
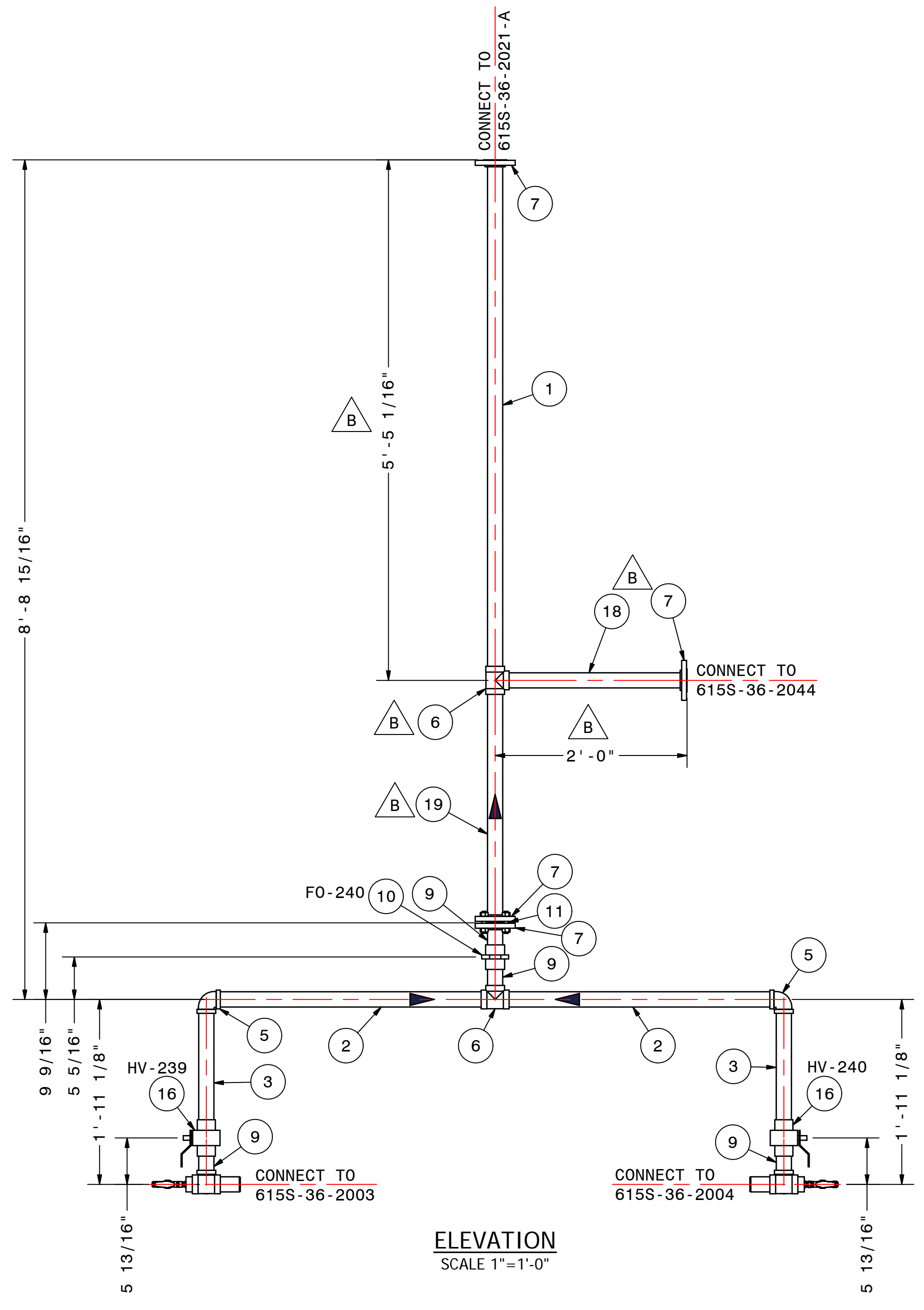
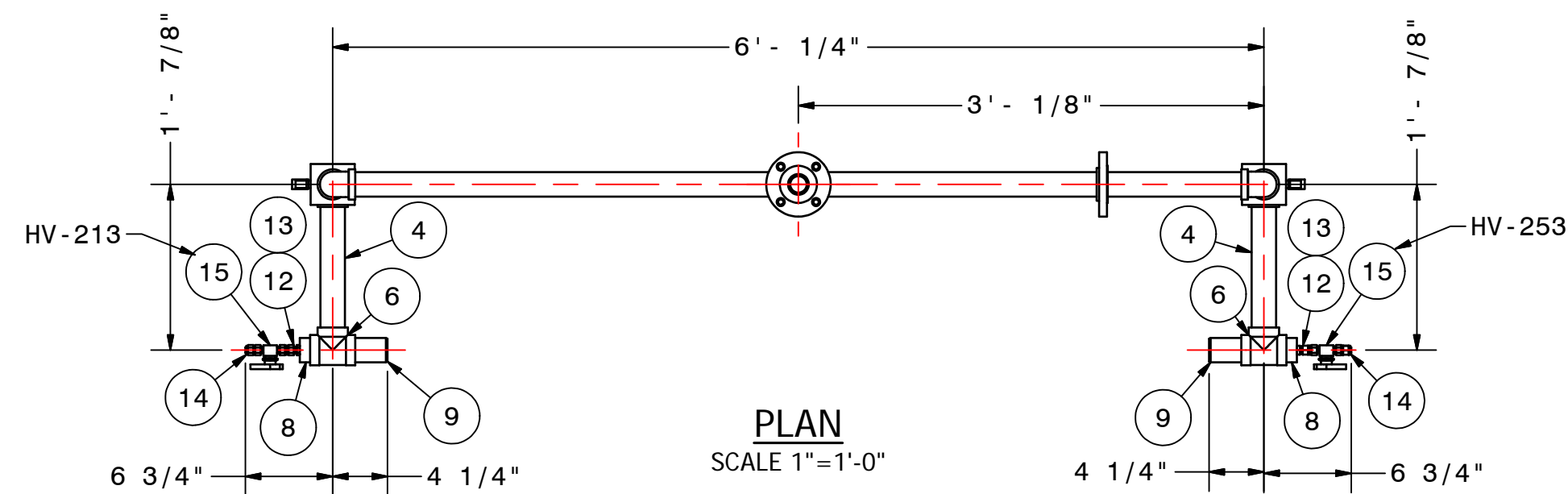
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO.: NGD-2007-AA1-4"**

CAGE CODE <b>63131</b>	SIZE <b>D</b>	LOCATION <b>24097</b>	DWG NO <b>615S-36-2007</b>	<b>C</b>
SCALE	AS NOTED	SHEET	5 OF 5	

8 7 6 5 4 3 2 1

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1266	KP	A.BARLOW	1/29/2018
B	ADDED PIPE & FLG FOR 2011 CONNECTION PER ECO #1309	KGG	A.BARLOW	10/9/2017



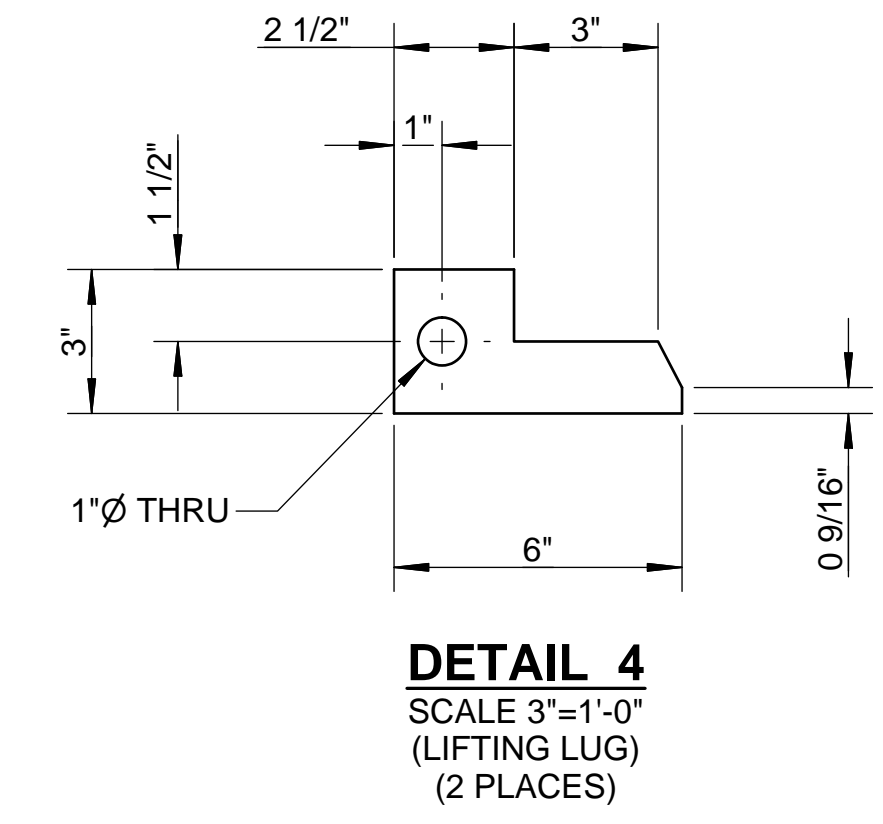
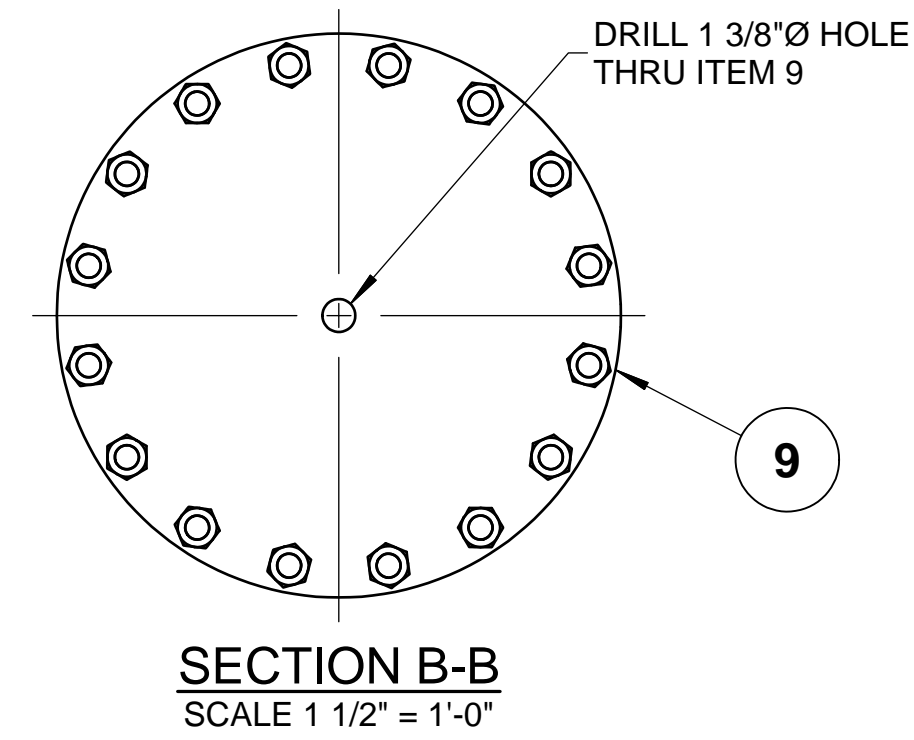
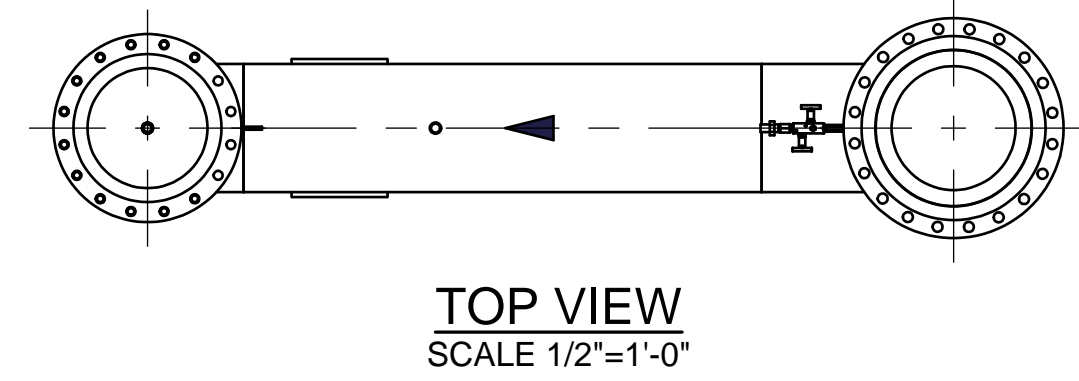
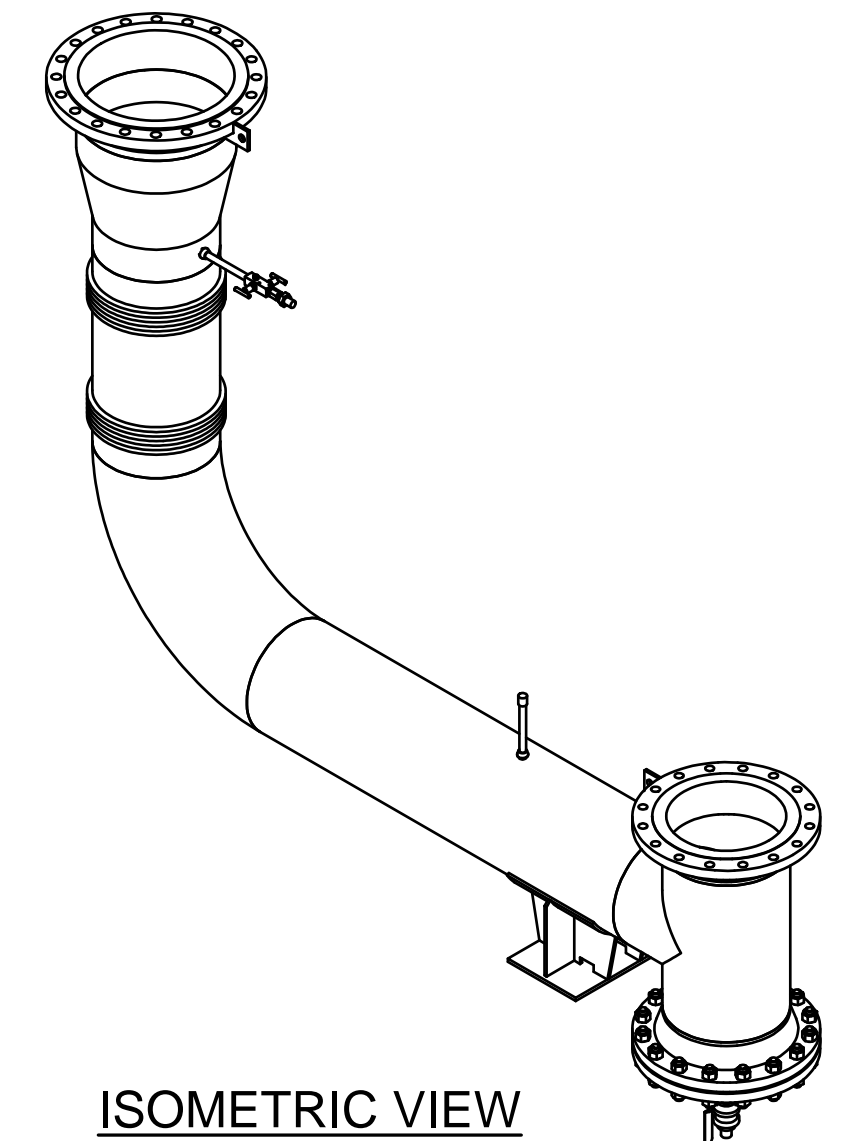
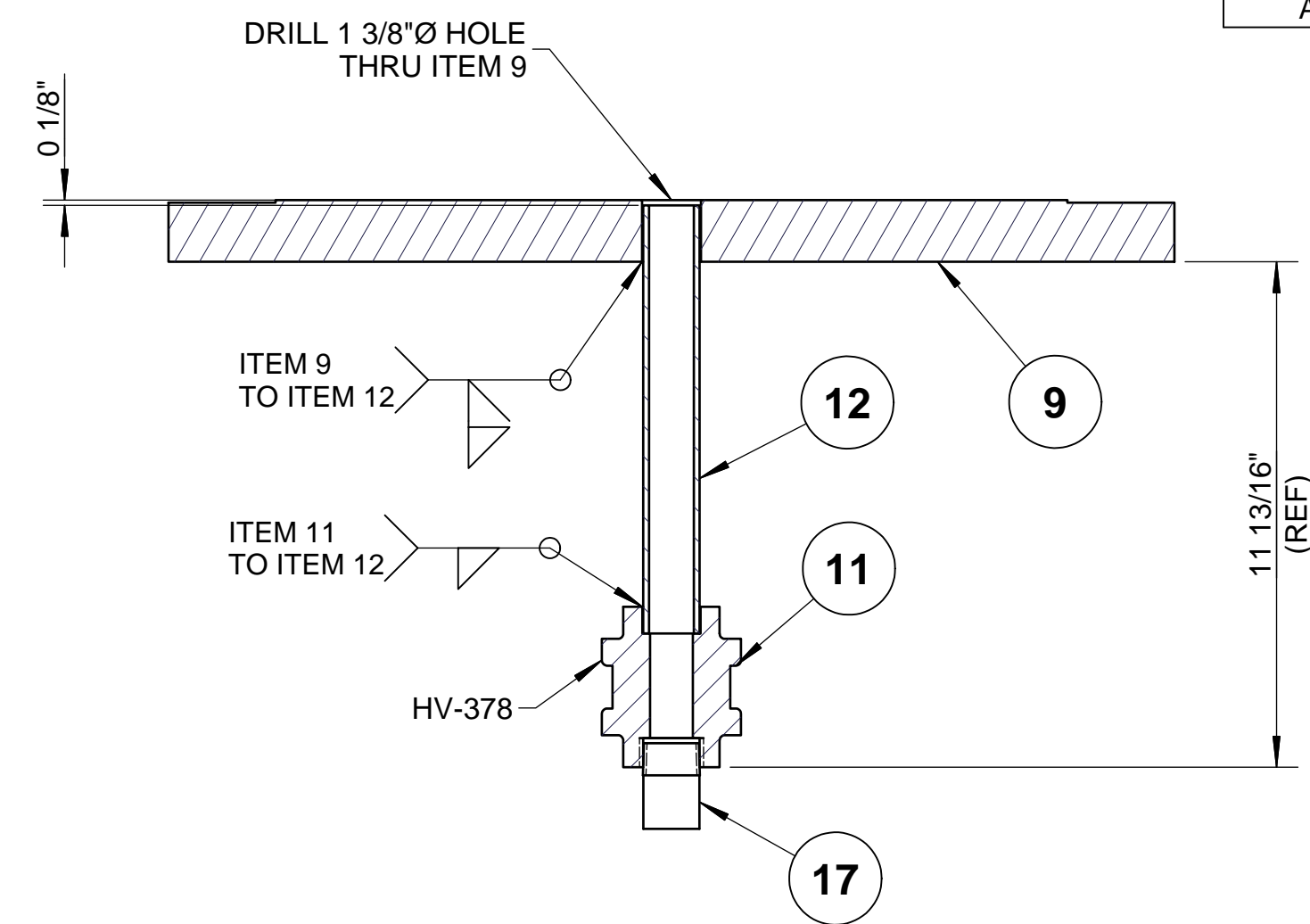
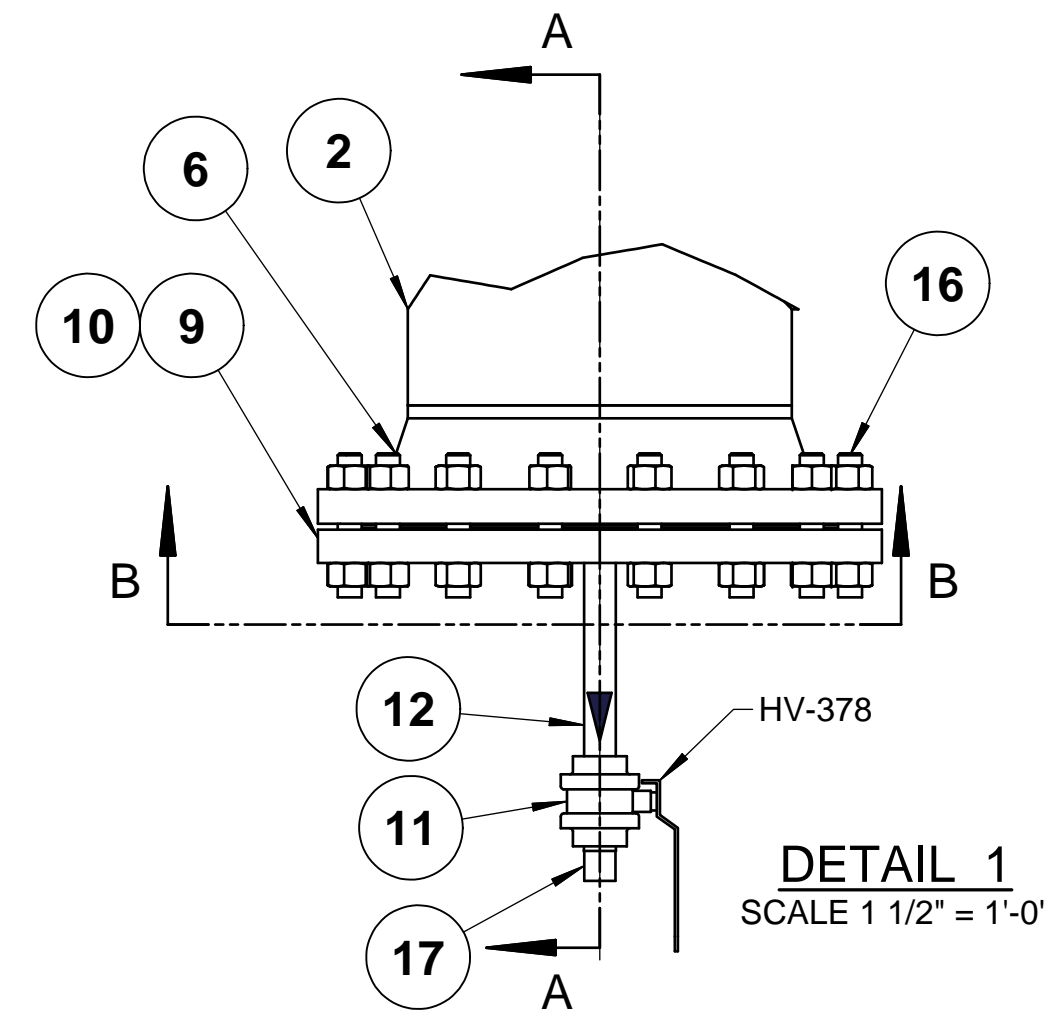
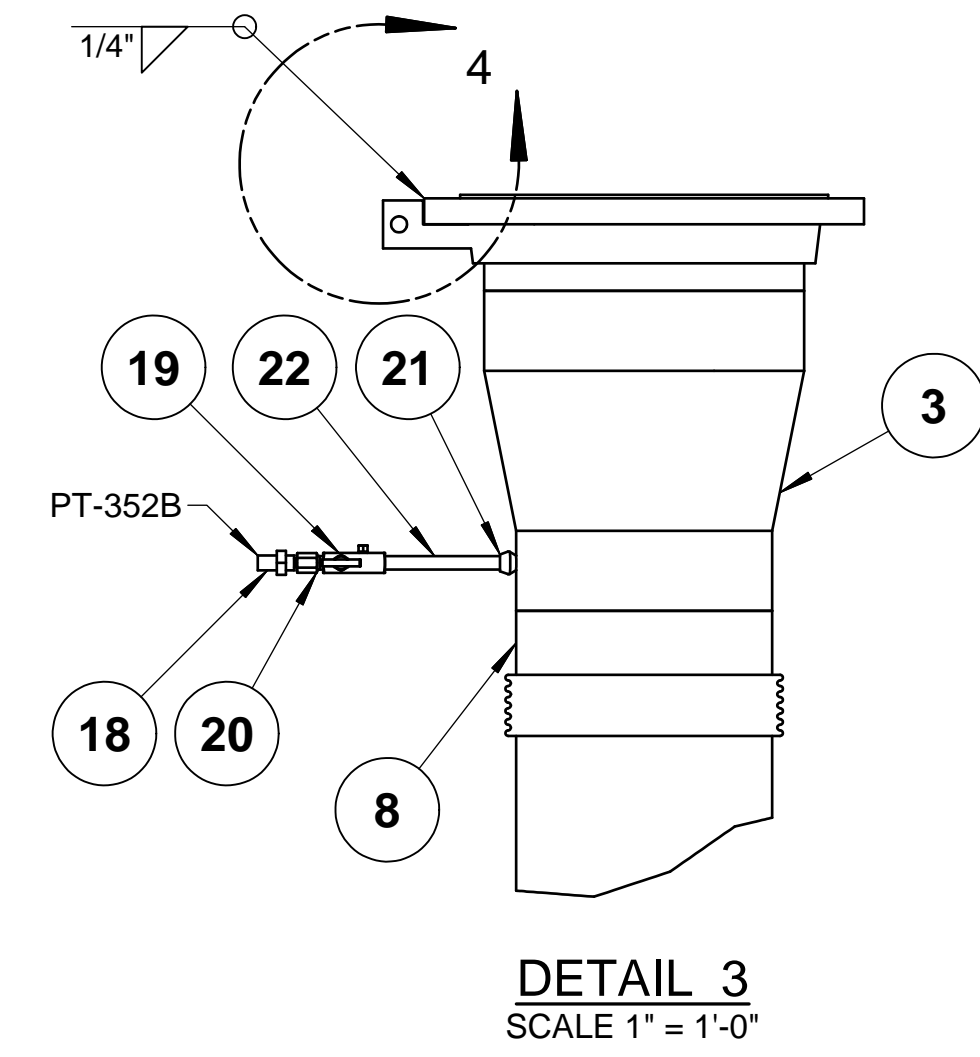
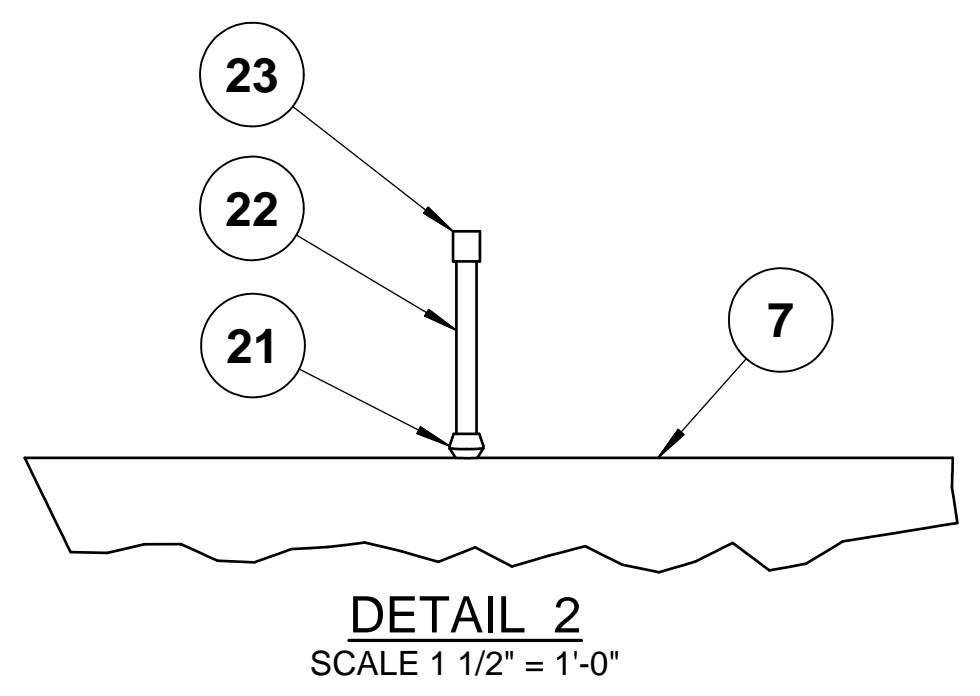
- NOTES:
1. MATERIALS OF FABRICATION PER SP-FCE-50-3.
  2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIALS.

**PART NUMBER: 615S-36-2022**

PARTS LIST				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4524-007	5.29 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B
2	4524-007	5.60 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B
3	4524-007	2.42 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B
4	4524-007	1.73 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B
5	4538-007	4	ELL. 90 DEG 3000# SW 1 1/2"	ASTM A105
6	4555-007	4	TEE, EQUAL, 3000#, SW, 1 1/2"	ASTM A105
7	4642-007	4	FLG, SW, 150# RF, 1 1/2"	ASTM A105
8	8856-007-002	2	REDUCER, INSERT, 3000#, SW, 1 1/2" x 3/8"	ASTM A105
9	4597-007	6	NIPPLE, SCH80, SMLS, PBE, 1 1/2"	ASTM A106B
10	7948-003	1	ORIFICE, SWU, 1.5 NPS, 0.413	AISI 316L
11	8766-007	1	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 1 1/2"	
12	2984	2	MALE PIPE WLD CONNECTOR, 3/8 BE PIPE x 3/8 TUBE ENDS	AISI 316
13	2951	2	PORT CONNECTOR, TUBE STUB (Tx) x TUBE END	AISI 316
15	9208-002	2	BALL, TUBE ENDS, PTFE PKG, LIV LOAD SEAT	AISI 316
14	7826-002	2	PLU W/LANYARD, TUBE END	AISI 316
16	4420-005	2	VALVE, BALL, 600#, SW, 1 1/2"	Steel, Carbon
17	7567-081-044	4	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 1/2-13 UNC, 2.75" LNG	ASTM A193 GR. B7
18	4524-007	1.85 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B
19	4524-007	2.37 ft	PIPE, SCH80, SMLS, 1 1/2"	ASTM A53B

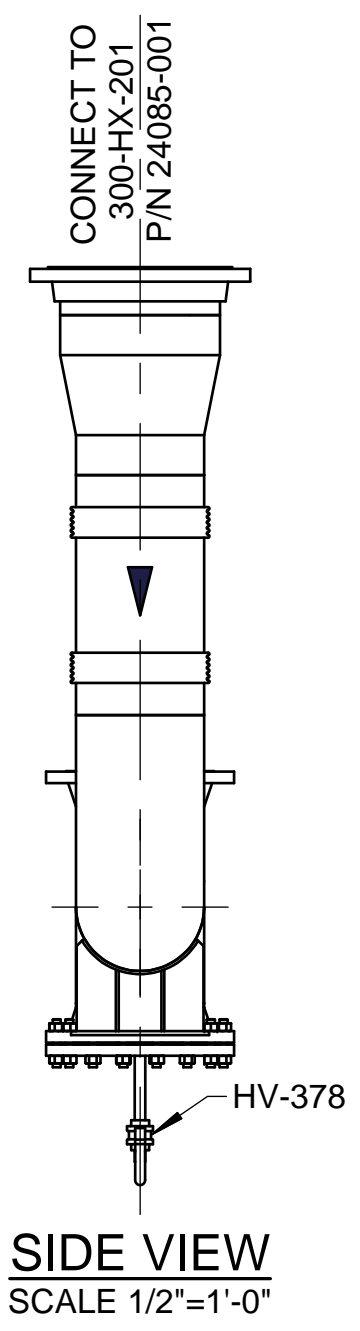
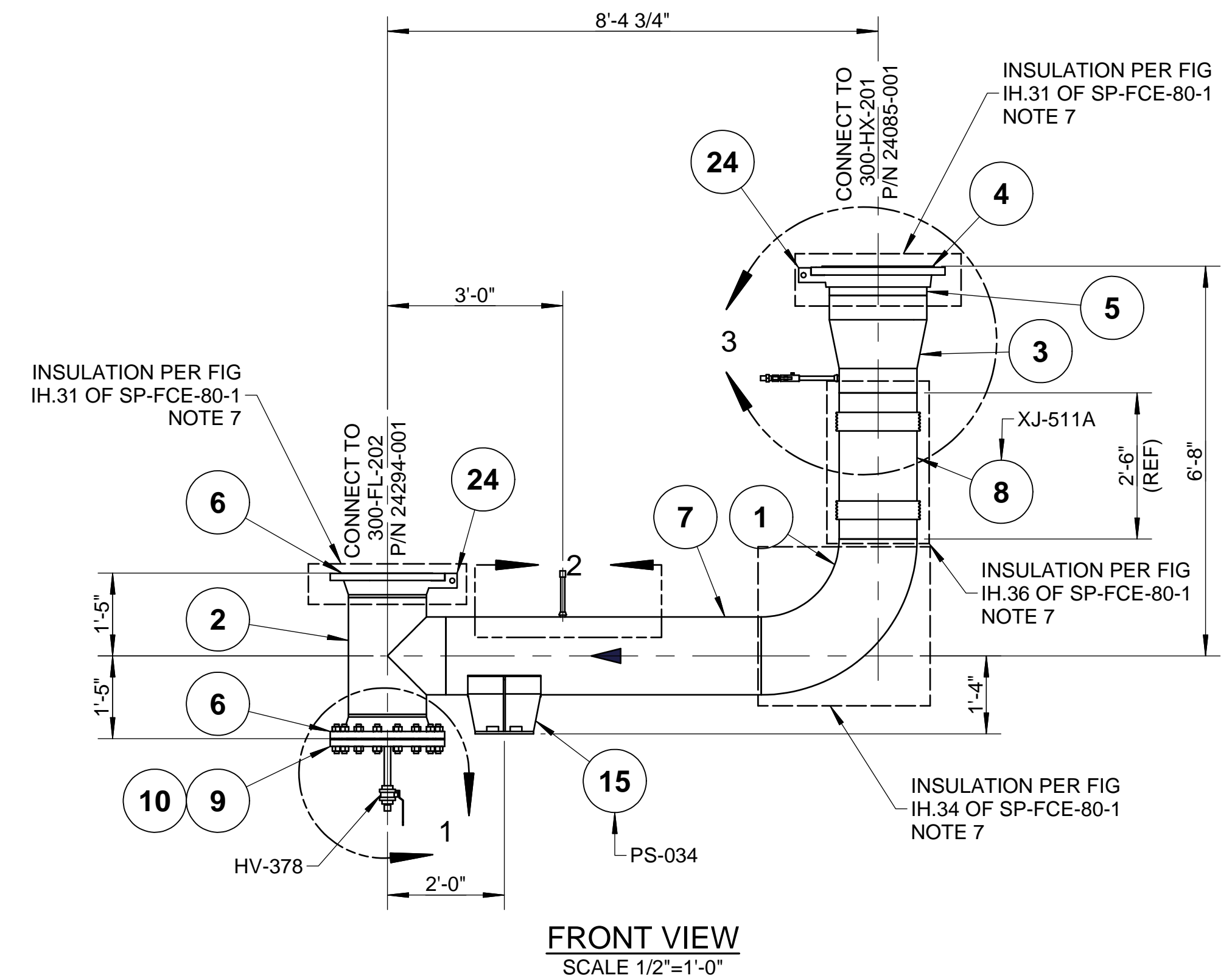
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	DRAWN: K.PERSICO 1/25/18	TITLE <b>SureSource 4000 PIPING ASSEMBLY</b> LINE NO.: NGD-2022-AA1-1 1/2"		
	ENGINEER: D.GEORGE 1/25/18	APPROVED: A.BARLOW 1/25/18		
	RELEASED: P.BEAUDOIN 1/25/18	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"		
REVISION INDICATOR FLAG NOTE	SIZE <b>D</b>	LOCATION <b>24066</b>	DWG NO <b>615S-36-2022</b>	
SCALE AS SHOWN		SHEET 1 OF 1		

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1270	KGK	A.BARLOW	1/30/18



**PART NUMBER: 615S-36-3004-A**

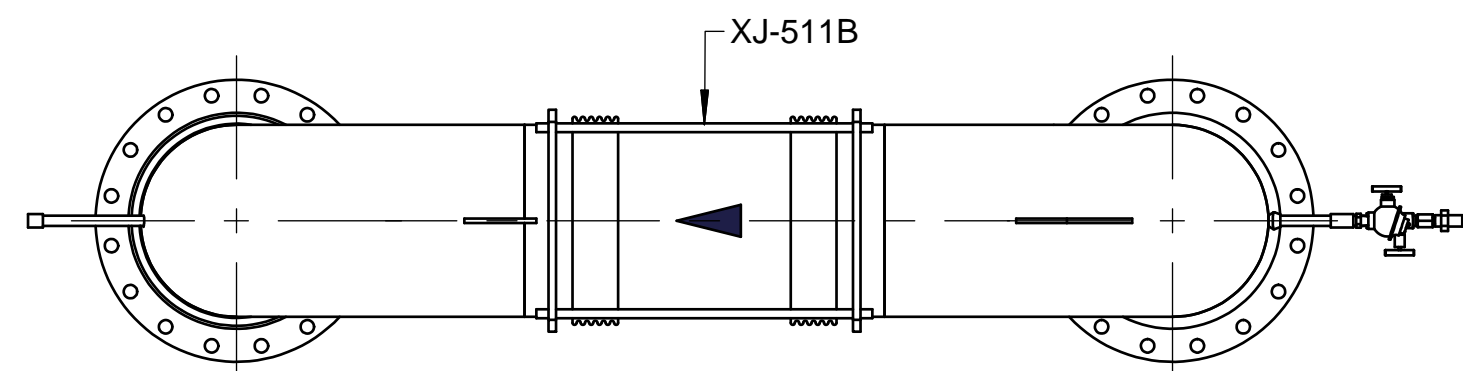
LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-017	1	ELL 90 DEG LR SCH10S, 16"	ASTM A403WP304/L-W
2	4560-017	1	TEE, EQUAL, SCH10, 16"	ASTM A403WP304/L-W
3	4567-019-017	1	REDUCER, CON, SCH10S 20" x 16"	ASTM A403WP304/L-W
4	8682-019	1	FLG, LJ, 150#, 20"	ASTM A182F304/L
5	4615-019	1	STUB END, SCH10S, 20"	ASTM A403WP304/L-W
6	4646-017	2	FLG, WN, 150# RF, SCH10S BORE, 16"	ASTM A182F304/L
7	4520-017	5.40 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304/L
8	24331-029	1	EXP JOINT, 16", UNIV, 30" LG.	AISI 304L
9	4654-017	1	FLG, BLIND, 150# RF, 16"	ASTM A105
10	7972-017	1	GASKET 150# KMPRFL, GRAPHITE FACING, 1/8THK, 16"	
11	21957-005	1	VALVE BALL 1" FIG 1030 SW X THD	AISI 304
12	4522-005	0.83 ft	1" PIPE SCH40S EFW	ASTM A312 TP304/L
15	25115-17-130-12-8	1	HEAVY DUTY SADDLE, 16", AISI 304, INSULATION BAND SLOT, NO SLIDE BEARING, 12" LNG, 8" BOP	AISI 304
16	8684-161-096	16	BOLT-STUD W/ A194-8M HV-HX NUTS, 1-8 UNC, 6" LNG	ASTM A193B8M
17	4608-005	1	PLUG, ROUND HEAD, SCR, 1"	ASTM A182F304/L
18	24707-001	1	TRANSMITTER,PRESSURE,1/4"FNPT,4-20mA,0-2 PSIG	AISI 304
19	7695-004	1	VALVE, INST, 1/2" FNPT x 1/2" MNPT	AISI 316
20	8887-005	1	ADAPTER-REDUCING 1/2"FNPTx1/4"MNPT	AISI 316
21	4605-017-003	2	PIPET (SOCKOLET), 10S x CL 3M (3000#), 16" x 1/2"	ASTM A182F304/L
22	4522-003	1.33 ft	1/2" PIPE SCH40S EFW	ASTM A312 TP304/L
23	4580-003	1	CAP, 3000#, SCR, 1/2"	ASTM A182F304/L
24	18100-005-050	2	PLATE, 3/8, 3x6	ASTM A240-304L
25	22526-001	218 sq ft	INSULATION, 2"	MINERAL WOOL
26	20582-001	102 sq ft	JACKET, .020" THK	ALUMINUM



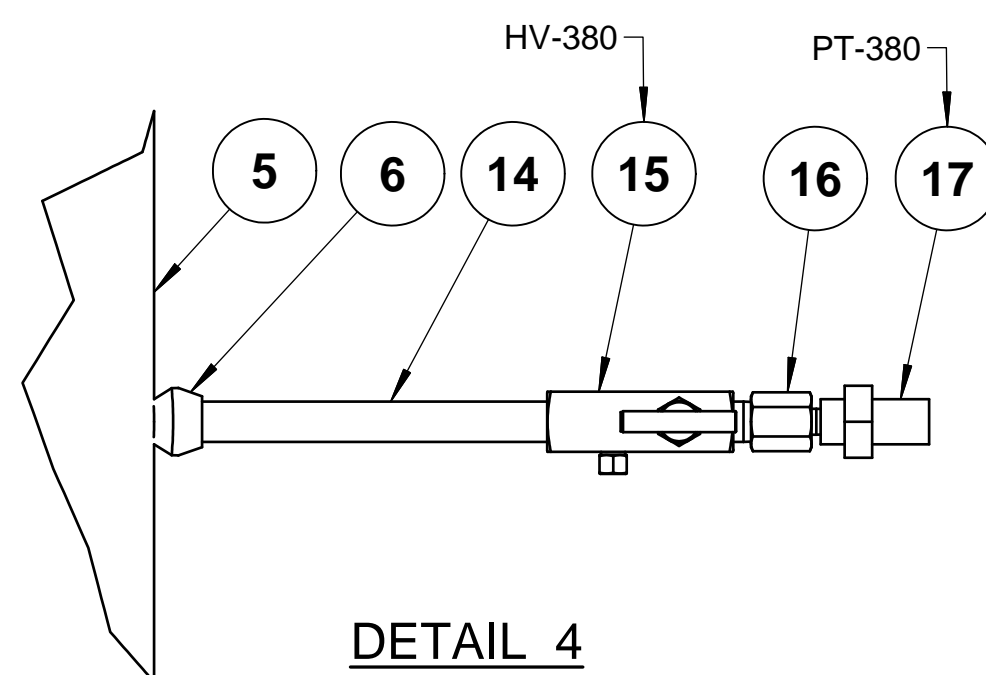
**NOTES:**

- MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
- WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
- PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
- REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
- NOTE DELETED.
- INSULATION LAYERING PER LINE LIST 615S-01-02.
- INSULATION PER SP-FCE-80-1.

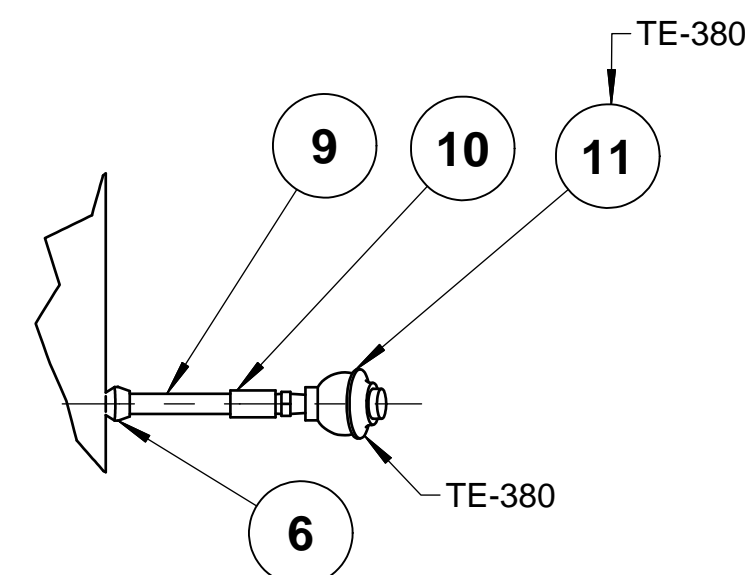
FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC. CAGE CODE <b>63131</b>	SIGNATURES		3 Great Pasture Rd., Danbury, CT 06813  <b>SureSource 4000 PIPING ASSEMBLY</b> LINE NO.: AG-3004-AF-16"-ih	
	DRAWN: <b>K.PERSICO</b> 11/23/16	ENGINEER: <b>P.DJORAJIA</b> 11/23/16		TITLE
	APPROVED: <b>A.BARLOW</b> 11/23/16	RELEASED: <b>A.HADJIS</b> 11/23/16		UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"
	REVISION INDICATOR FLAG NOTE	SIZE LOCATION <b>D 24097</b>		DWG NO <b>615S-36-3004</b>
SCALE AS SHOWN		SHEET 1 OF 2		



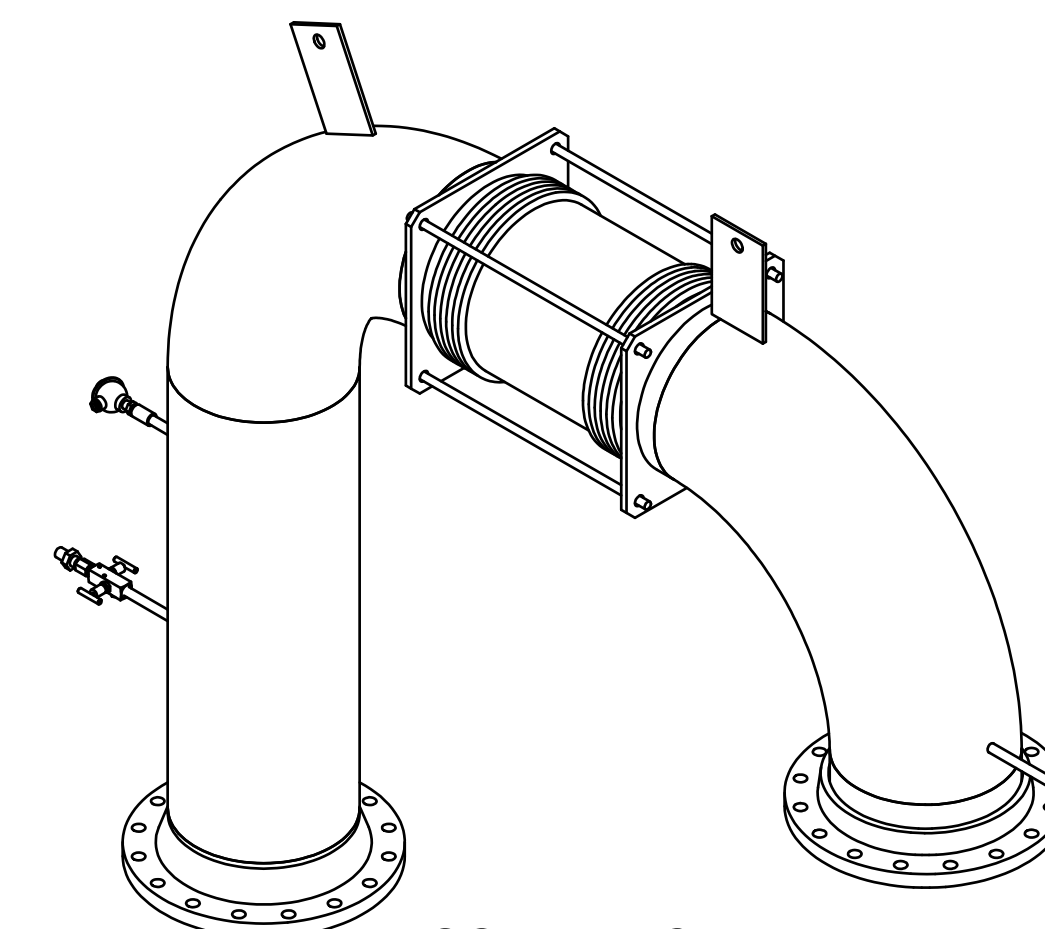
TOP VIEW  
SCALE 3/4"=1'-0"



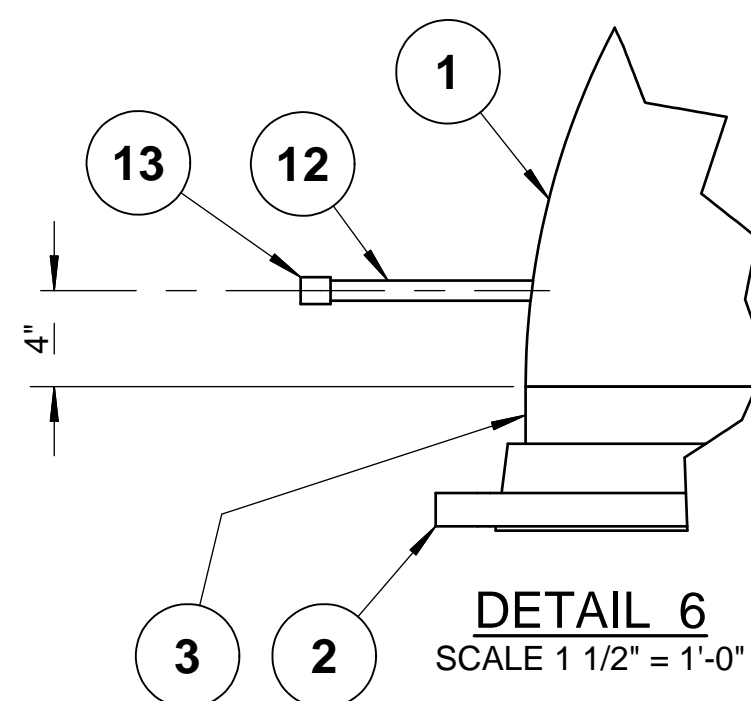
DETAIL 4  
SCALE 3"=1'-0"



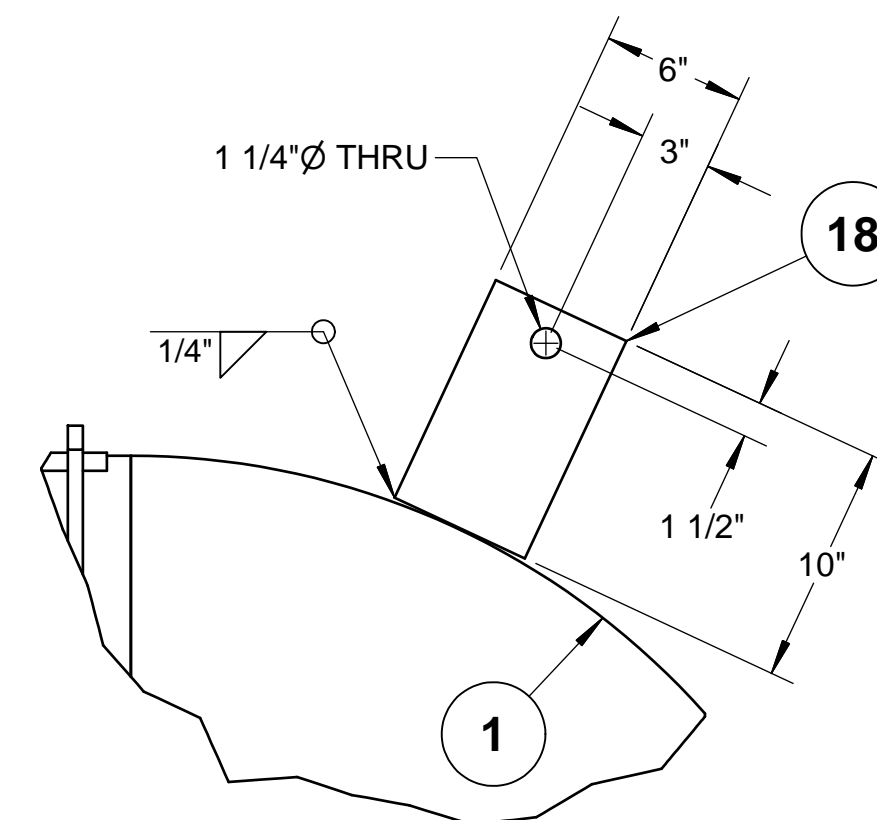
DETAIL 5  
SCALE 1 1/2"=1'-0"



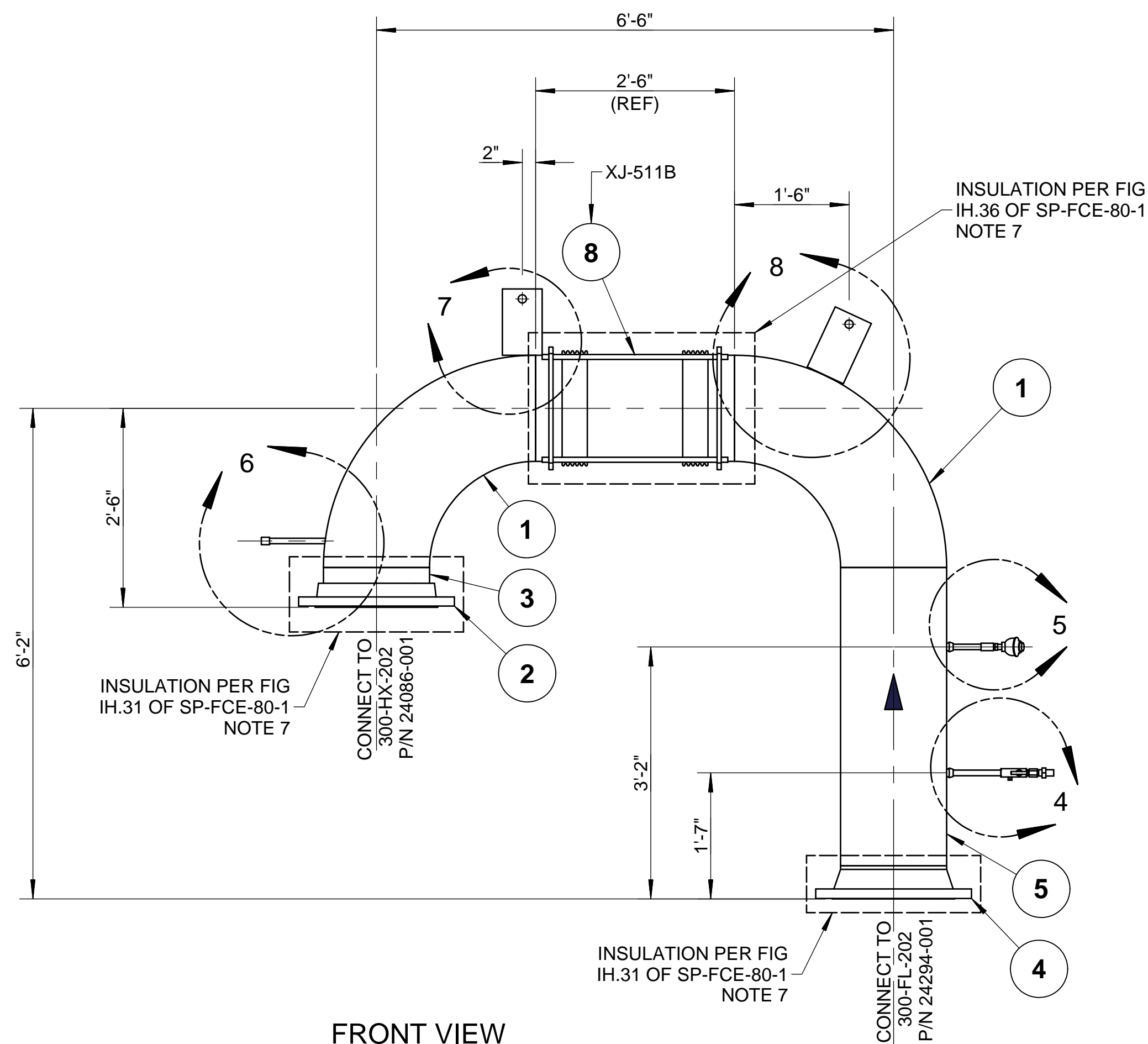
ISOMETRIC VIEW



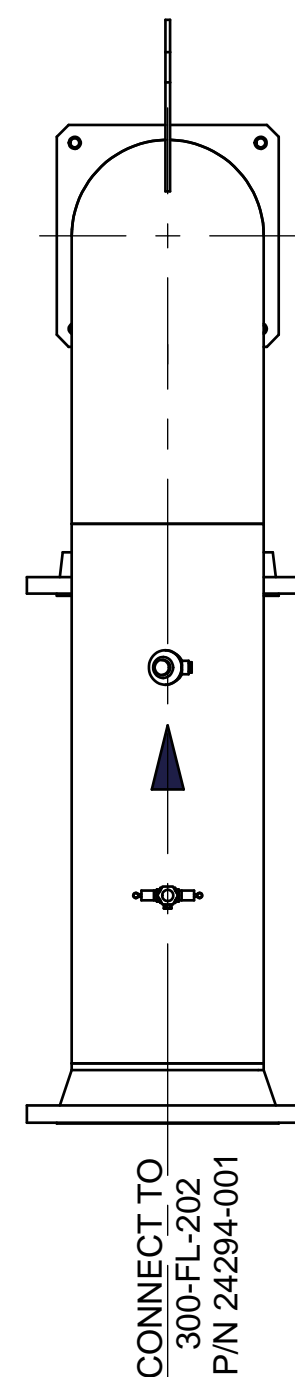
DETAIL 6  
SCALE 1 1/2"=1'-0"



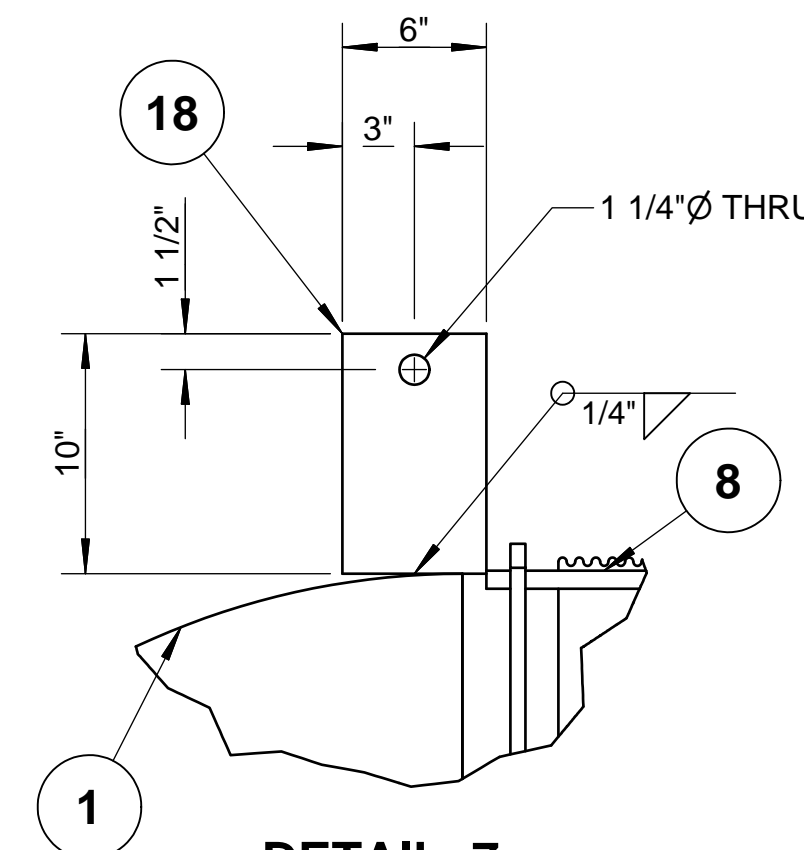
DETAIL 8  
SCALE 1 1/2"=1'-0"



FRONT VIEW  
SCALE 3/4"=1'-0"



SIDE VIEW  
SCALE 3/4"=1'-0"



DETAIL 7  
SCALE 1 1/2"=1'-0"

NOTES:

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. NOTE DELETED.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

PART NUMBER: 615S-36-3004-B

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-017	2	ELL 90 DEG LR SCH10S, 16"	ASTM A403WP304/L-W
2	8682-017	1	FLG, LJ, 150#, 16"	ASTM A182F304/L
3	4615-017	1	STUB END, SCH10S, 16"	ASTM A403WP304/L-W
4	4646-017	1	FLG, WN, 150# RF, SCH10S BORE, 16"	ASTM A182F304/L
5	4520-017	3.75 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304/L
6	4605-017-003	2	PIPET (SOCKOLET), 10S x CL 3M (3000#), 16" x 1/2"	ASTM A182F304/L
8	24331-030	1	EXP JOINT, 16", UNIV, 36" LG.	AISI 304L
9	4522-003	0.42 ft	1/2" PIPE SCH40S EFW	ASTM A312 TP304/L
10	8876-003	1	COUPLING, 3000#, SCR, 1/2"	ASTM A182F304/L
11	8727-025	1	THERMOCOUPLE, TYPE K, UNGRND, 1/8" .15"	AISI 304
12	4522-003	0.75 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
13	4580-003	1	CAP, 3000#, SCR, 1/2"	ASTM A182F304/L
14	4522-003	0.67 ft	1/2" PIPE SCH40S EFW	ASTM A312 TP304/L
15	7695-004	1	VALVE, INST, 1/2" FNPT x 1/2" MNPT	AISI 316
16	8887-005	1	ADAPTER-REDUCING 1/2" FNPT x 1/4" MNPT	AISI 316
17	24707-001	1	TRANSMITTER, PRESSURE, 1/4" FNPT, 4-20mA, 0-2 PSIG	AISI 304
18	18100-005-050	2	PLATE, 3/8, 6x10	ASTM A240-304L
19	22526-001	165 sq ft	INSULATION, 2"	MINERAL WOOL
20	20582-001	77 sq ft	JACKET, .020" THK	ALUMINUM

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**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

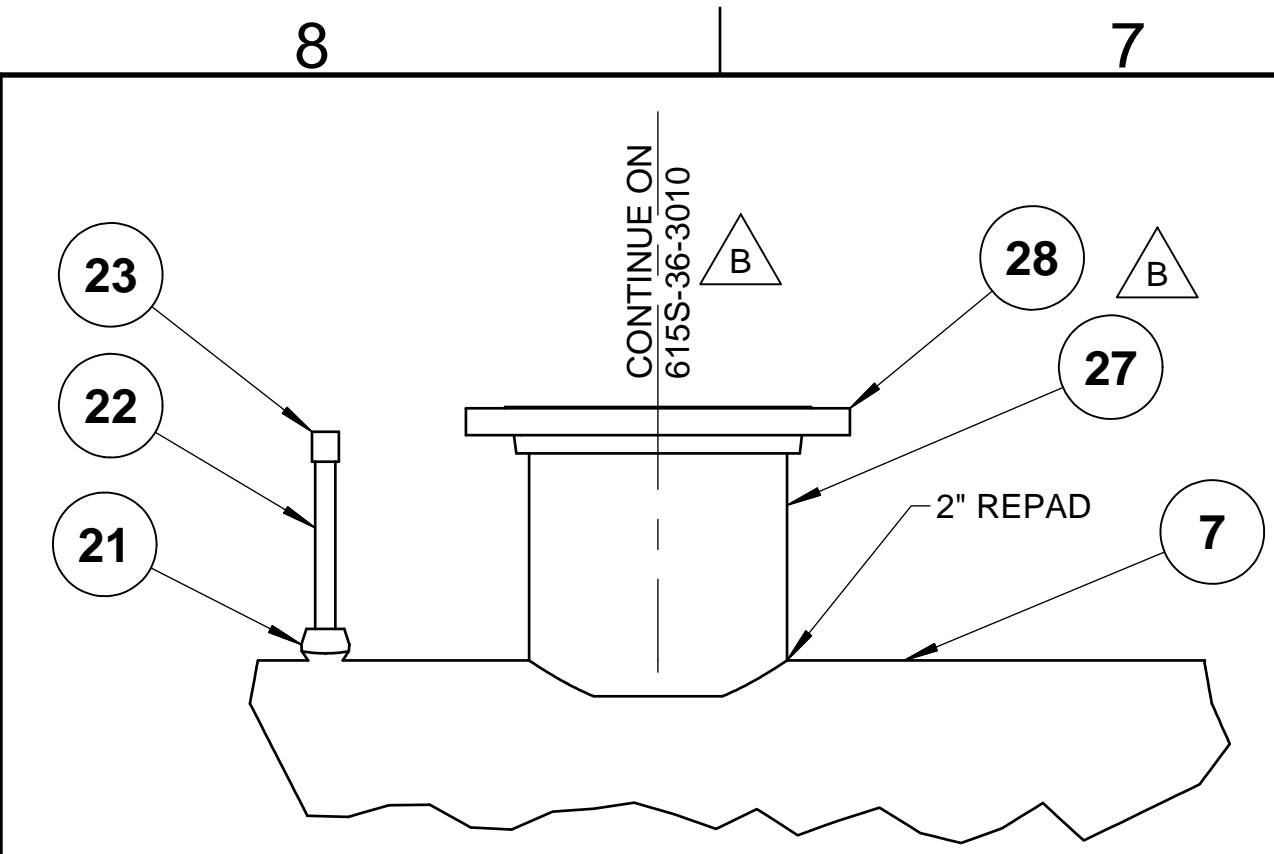
TITLE: **SureSource 4000 PIPING ASSEMBLY**  
LINE NO.: AG-3004-AF-16"-ih

CAGE CODE: **63131**

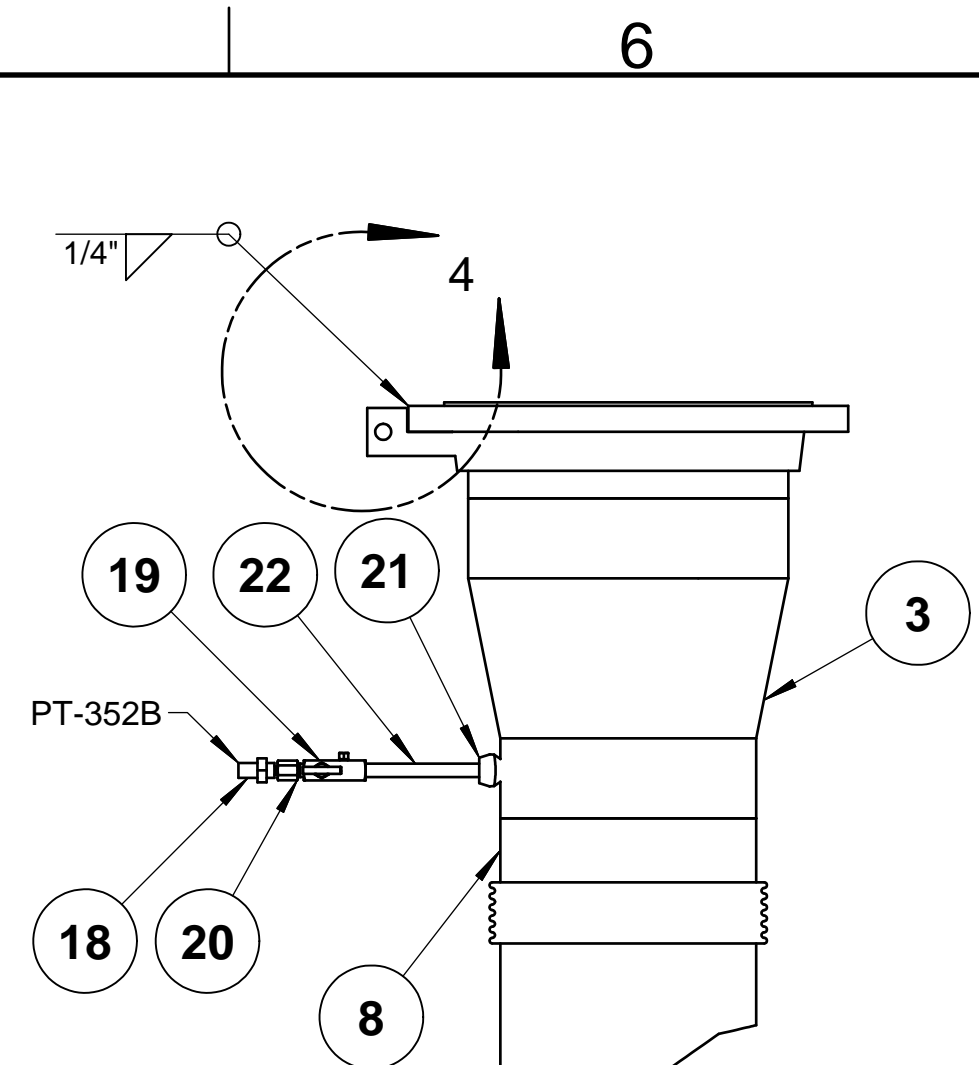
SIZE: **D** LOCATION: **24097** DWG NO: **615S-36-3004**

SCALE: AS SHOWN SHEET: **2 OF 2**

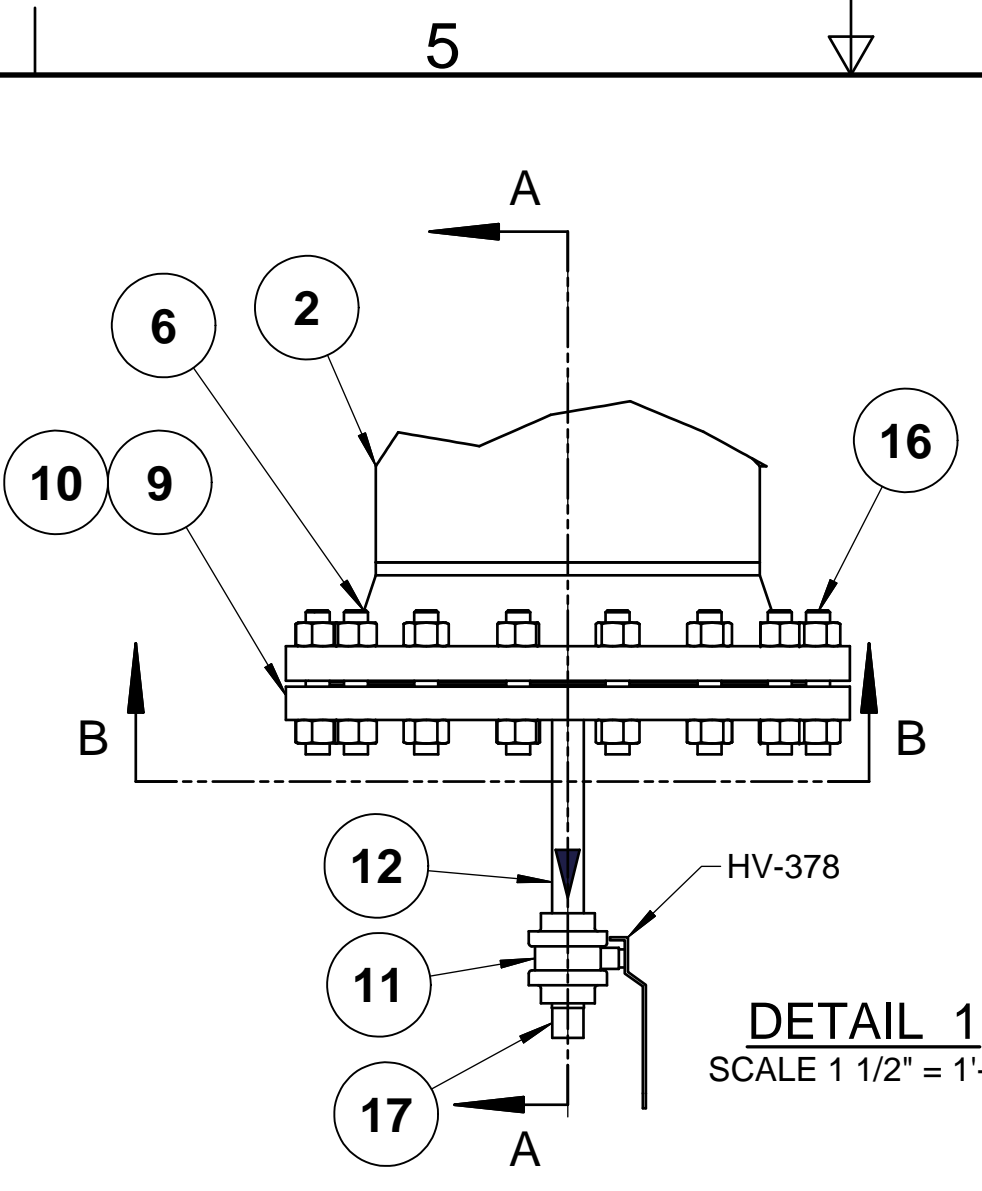
REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1270	KGG	A.BARLOW	1/30/18
B	REVISION PER ECO# 1311	KGG	A.BARLOW	5/7/2018



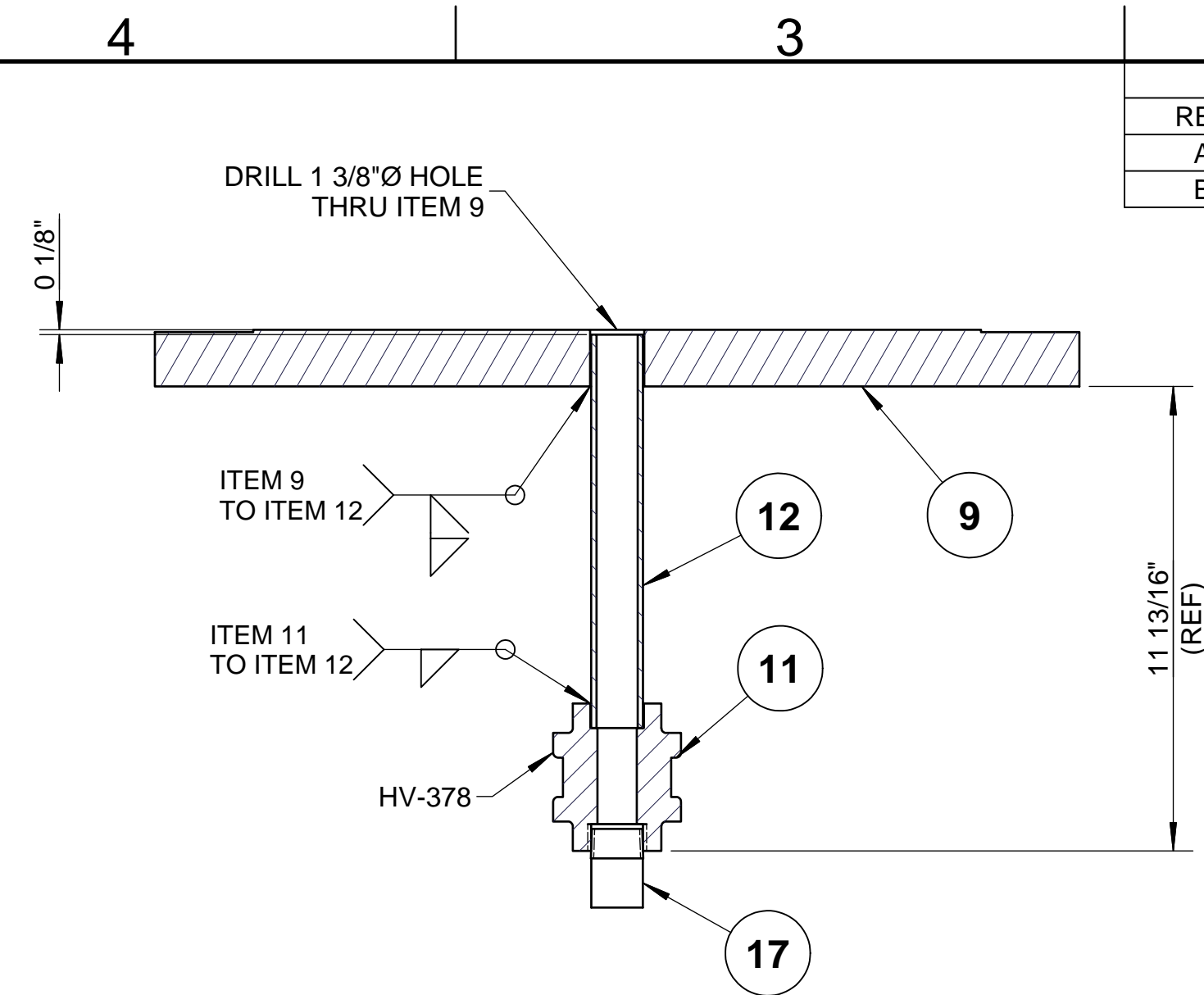
**DETAIL 2**  
SCALE 1 1/2" = 1'-0"



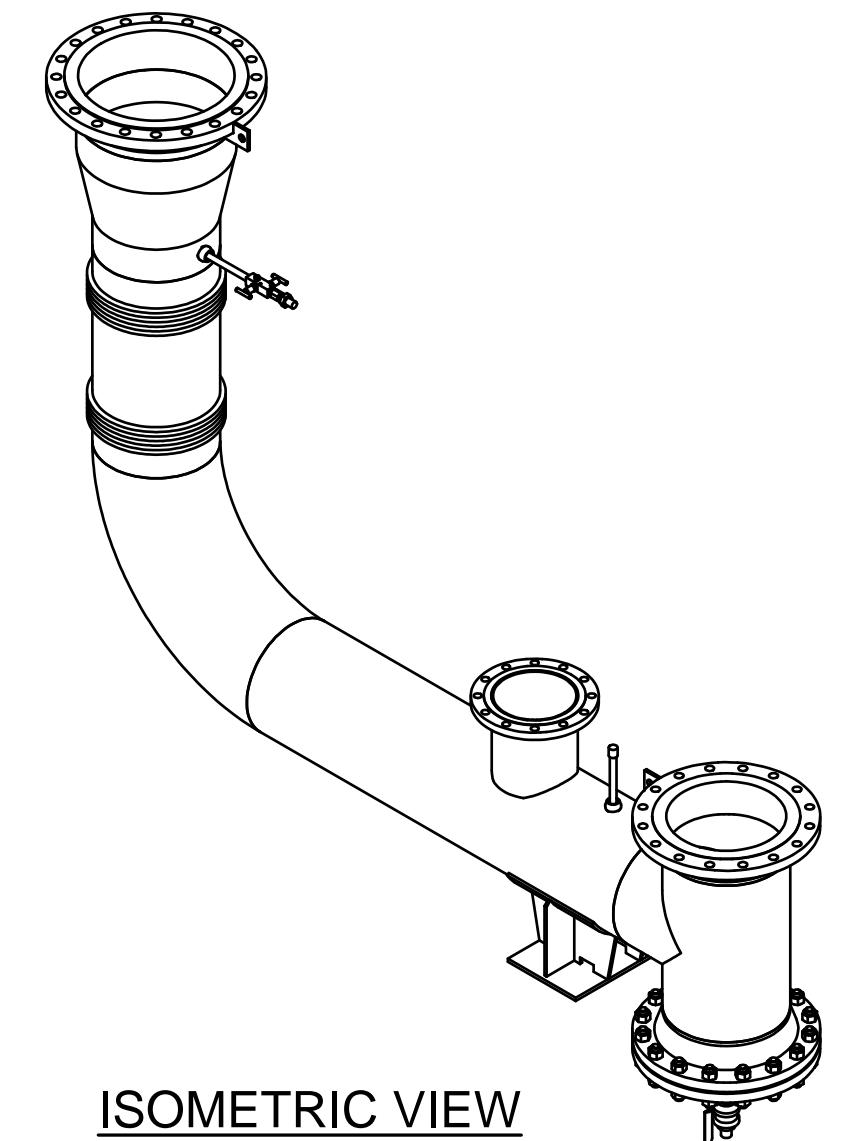
**DETAIL 3**  
SCALE 1" = 1'-0"



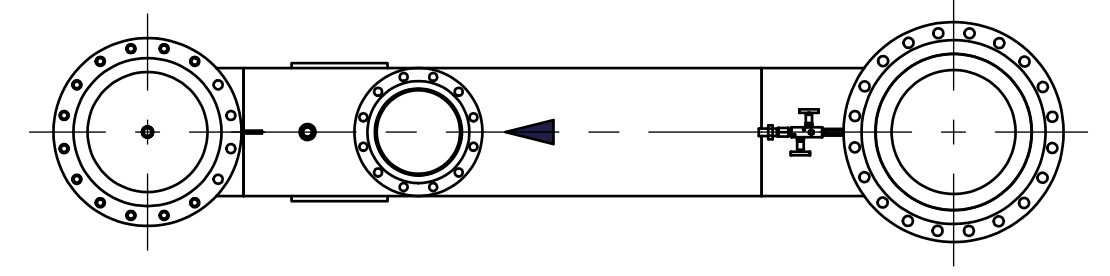
**DETAIL 1**  
SCALE 1 1/2" = 1'-0"



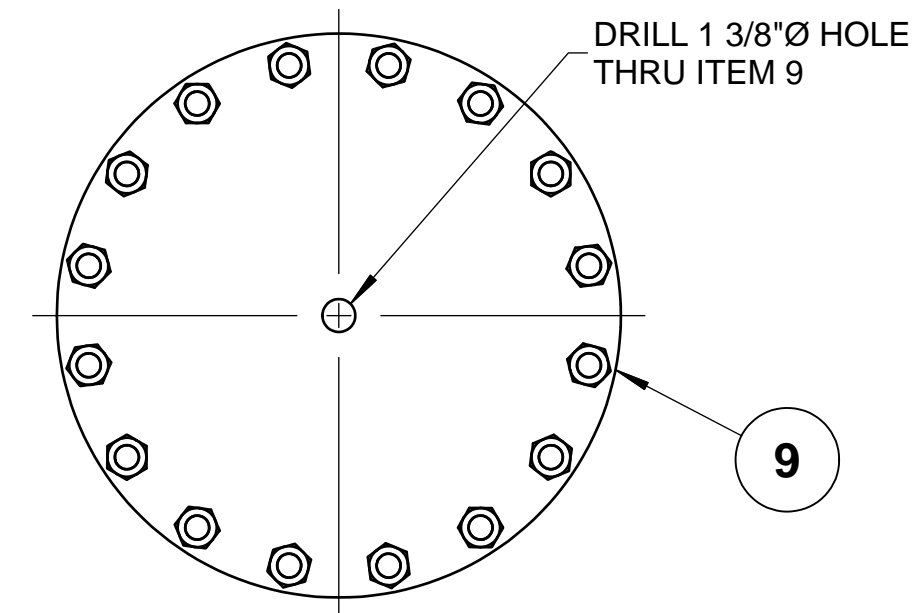
**SECTION A-A**  
SCALE 3" = 1'-0"



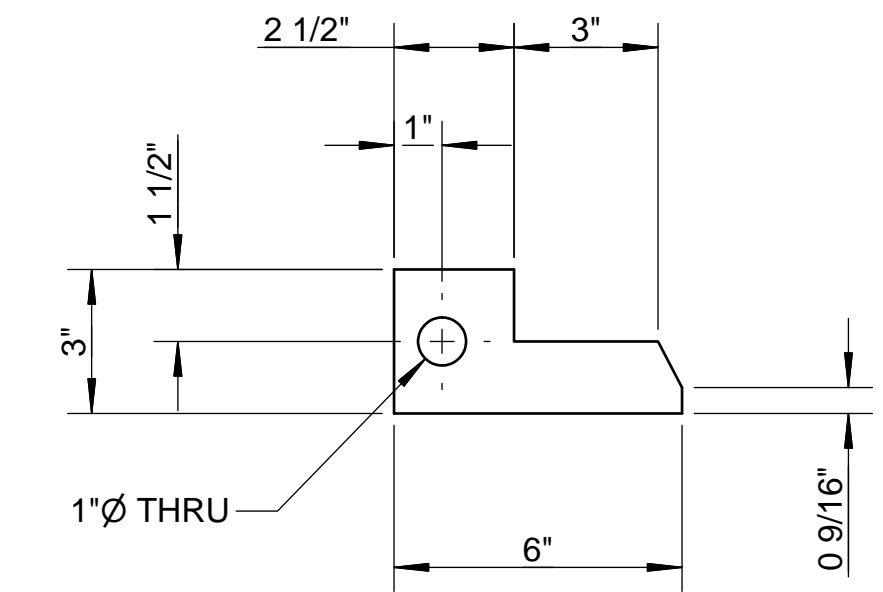
**ISOMETRIC VIEW**



**TOP VIEW**  
SCALE 1/2" = 1'-0"



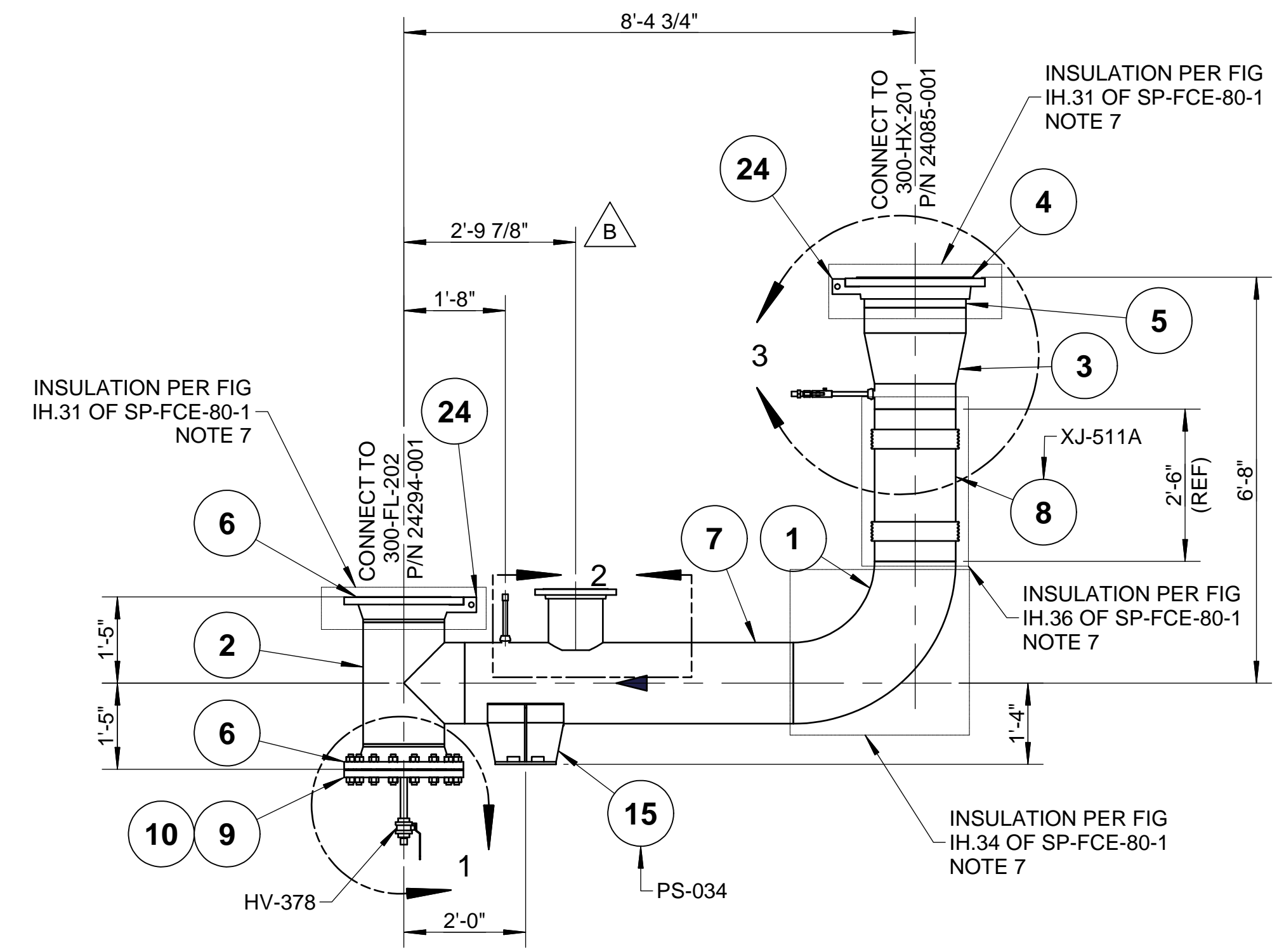
**SECTION B-B**  
SCALE 1 1/2" = 1'-0"



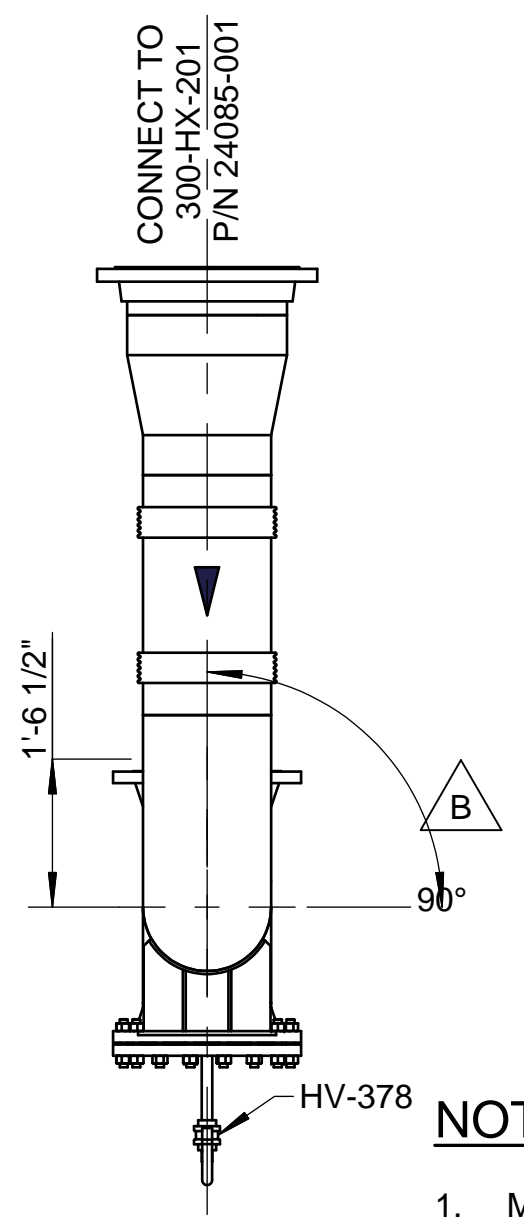
**DETAIL 4**  
SCALE 3" = 1'-0"  
(LIFTING LUG)  
(2 PLACES)

**PART NUMBER: 615S-36-3004-A**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-017	1	ELL 90 DEG LR SCH10S, 16"	ASTM A403WP304/L-W
2	4560-017	1	TEE, EQUAL, SCH10, 16"	ASTM A403WP304/L-W
3	4567-019-017	1	REDUCER, CON, SCH10S 20" x 16"	ASTM A403WP304/L-W
4	8682-019	1	FLG. L.J, 150#, 20"	ASTM A182F304/L
5	4615-019	1	STUB END, SCH10S, 20"	ASTM A403WP304/L-W
6	4646-017	2	FLG. WN, 150# RF, SCH10S BORE, 16"	ASTM A182F304/L
7	4520-017	5.40 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304/L
8	24331-029	1	EXP JOINT, 16", UNIV, 30" LG.	AISI 304L
9	4654-017	1	FLG. BLIND, 150# RF, 16"	ASTM A105
10	7972-017	1	GASKET 150# KMPRFL, GRAPHITE FACING, 1/8THK, 16"	
11	21957-005	1	VALVE BALL 1" FIG 1030 SW X THD	AISI 304
12	4522-005	0.83 ft	PIPE, SCH40S, EFW, 1"	ASTM A312 TP304/L
15	25115-17-130-12-8	1	HEAVY DUTY SADDLE, 16", AISI 304, INSULATION BAND SLOT, NO SLIDE BEARING, 12" LNG, 8" BOP	AISI 304
16	8684-161-096	16	BOLT-STUD W/ A194-8M HV-HX NUTS, 1-8 UNC, 6" LNG	ASTM A193B8M
17	4608-005	1	PLUG, ROUND HEAD, SCR, 1"	ASTM A182F304/L
18	24707-001	1	TRANSMITTER,PRESSURE,1/4"FNPT,4.2 0mA,0.2 PSIG	AISI 304
19	7695-004	1	VALVE, INST, 1/2" FNPT x 1/2" MNPT	AISI 316
20	8887-005	1	ADAPTER-REDUCING 1/2"FNPTx1/4"MNPT	AISI 316
21	4605-014-005	2	PIPET (SOCKET), 10S x CL 3M (3000#), 10" x 1"	ASTM A182F304/L
22	4522-003	1.33 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
23	4580-003	1	CAP, 3000#, SCR, 1/2"	ASTM A182F304/L
24	18100-005-050	2	PLATE, 3/8, 3x6	ASTM A240-304L
25	22526-001	218 sq ft	INSULATION, 2"	MINERAL WOOL
26	20582-001	102 sq ft	JACKET, .020" THK	ALUMINUM
27	4520-014	1.00 ft	PIPE, SCH10S, EFW 10"	ASTM A312 TP304/L
28	4638-014	1	FLANGE, SO, 150#, RF, 10"	ASTM A182F304/L



**FRONT VIEW**  
SCALE 1/2" = 1'-0"

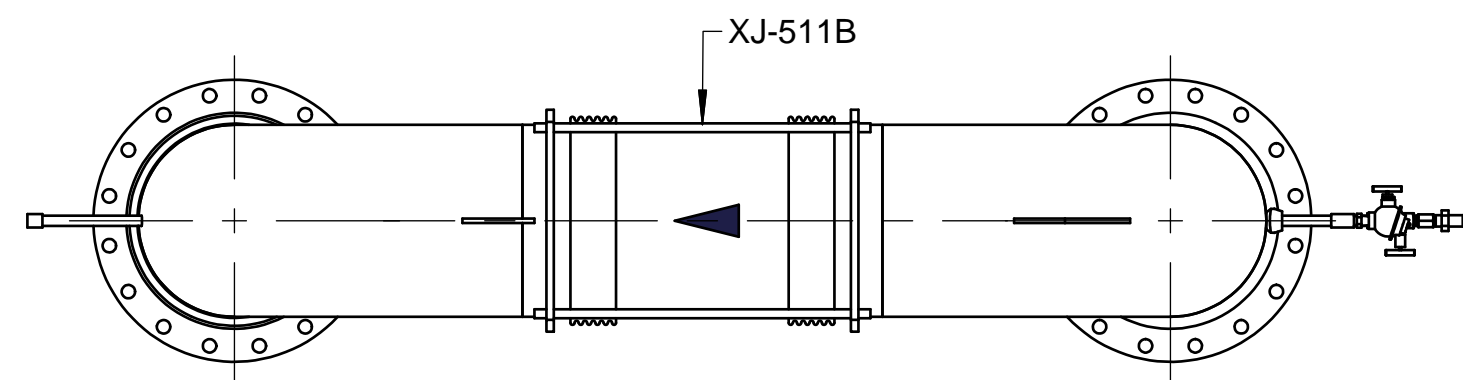


**SIDE VIEW**  
SCALE 1/2" = 1'-0"

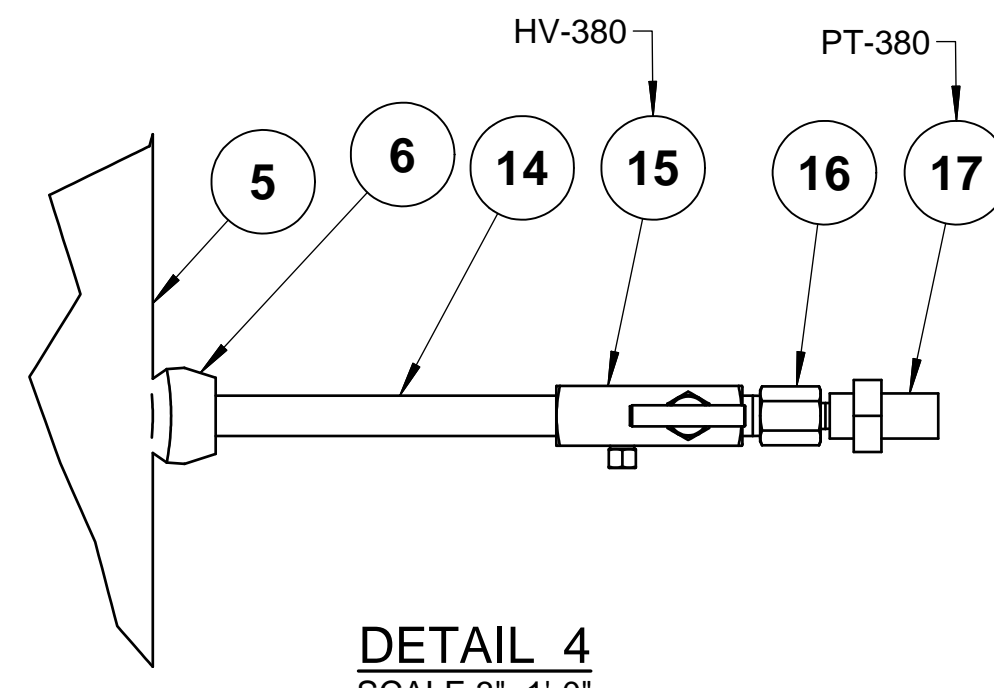
**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. NOTE DELETED.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

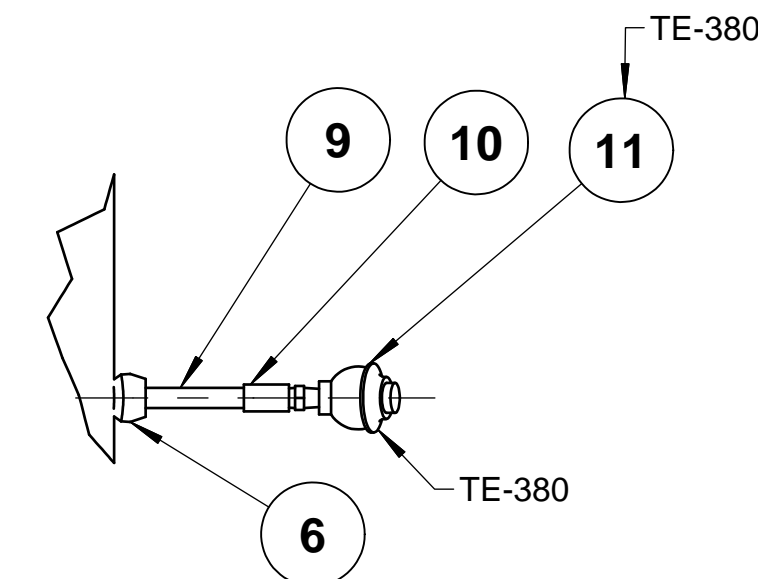
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	CAGE CODE <b>63131</b>		SCALE AS SHOWN SHEET 1 OF 2



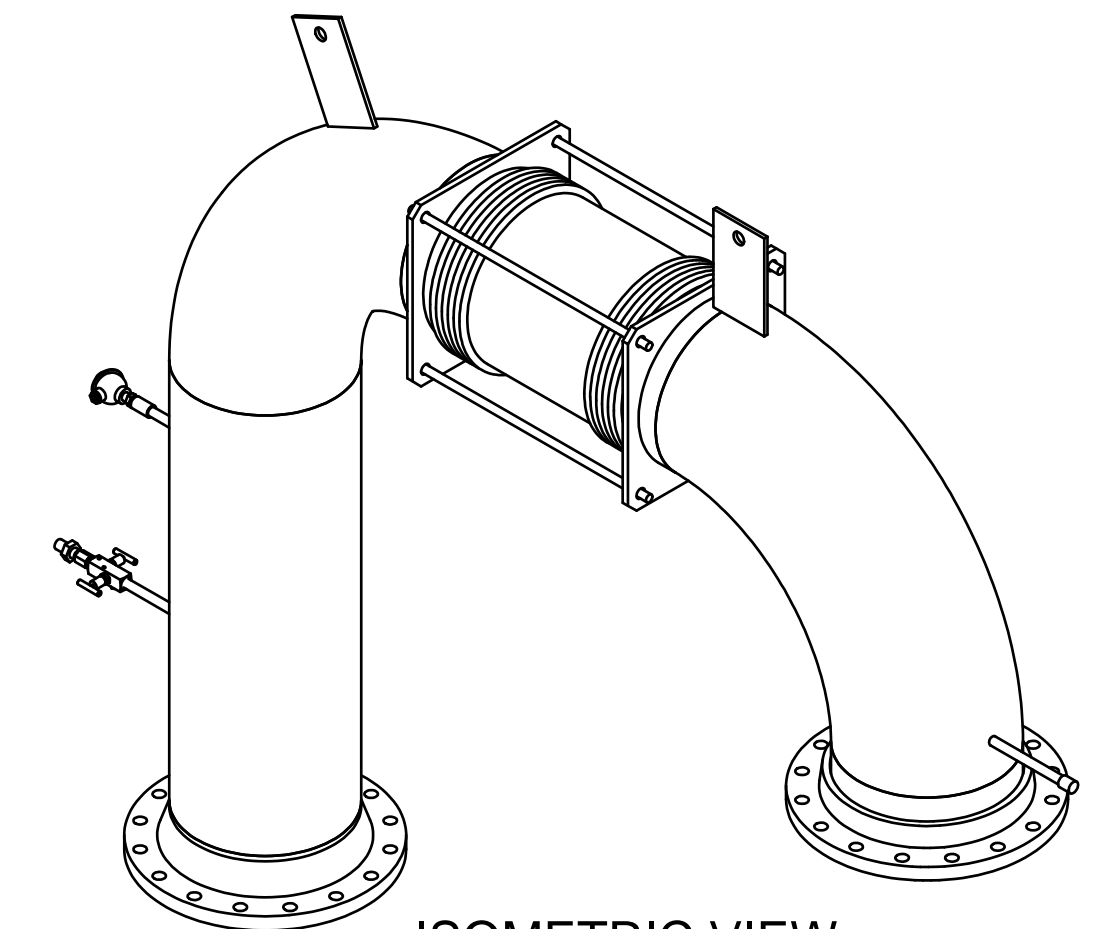
TOP VIEW  
SCALE 3/4"=1'-0"



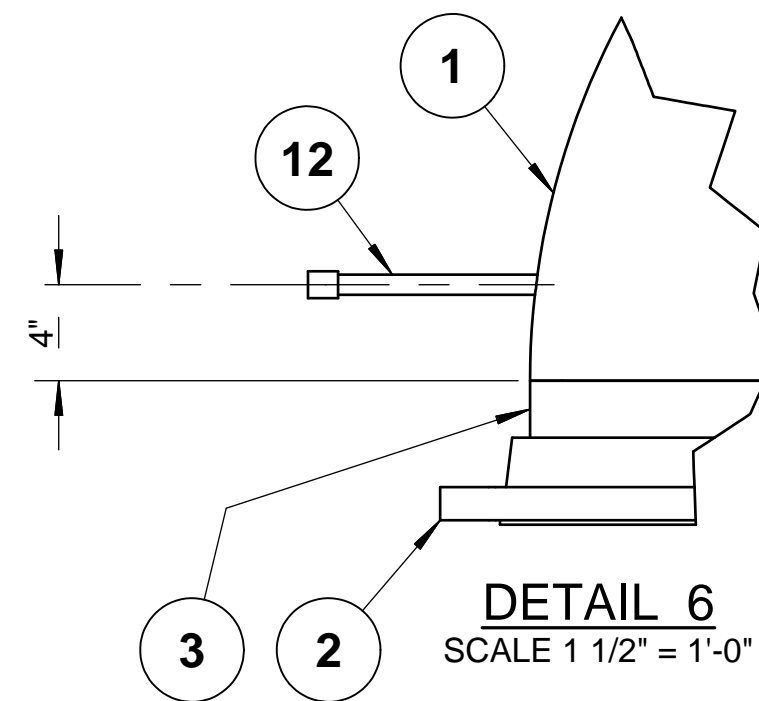
DETAIL 4  
SCALE 3"=1'-0"



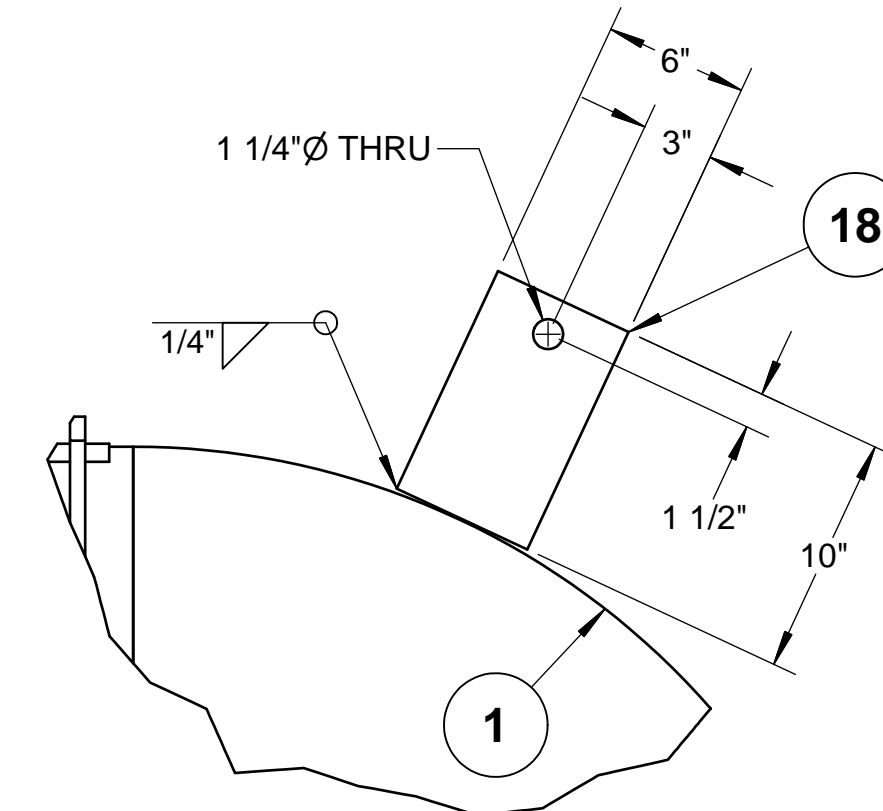
DETAIL 5  
SCALE 1 1/2"=1'-0"



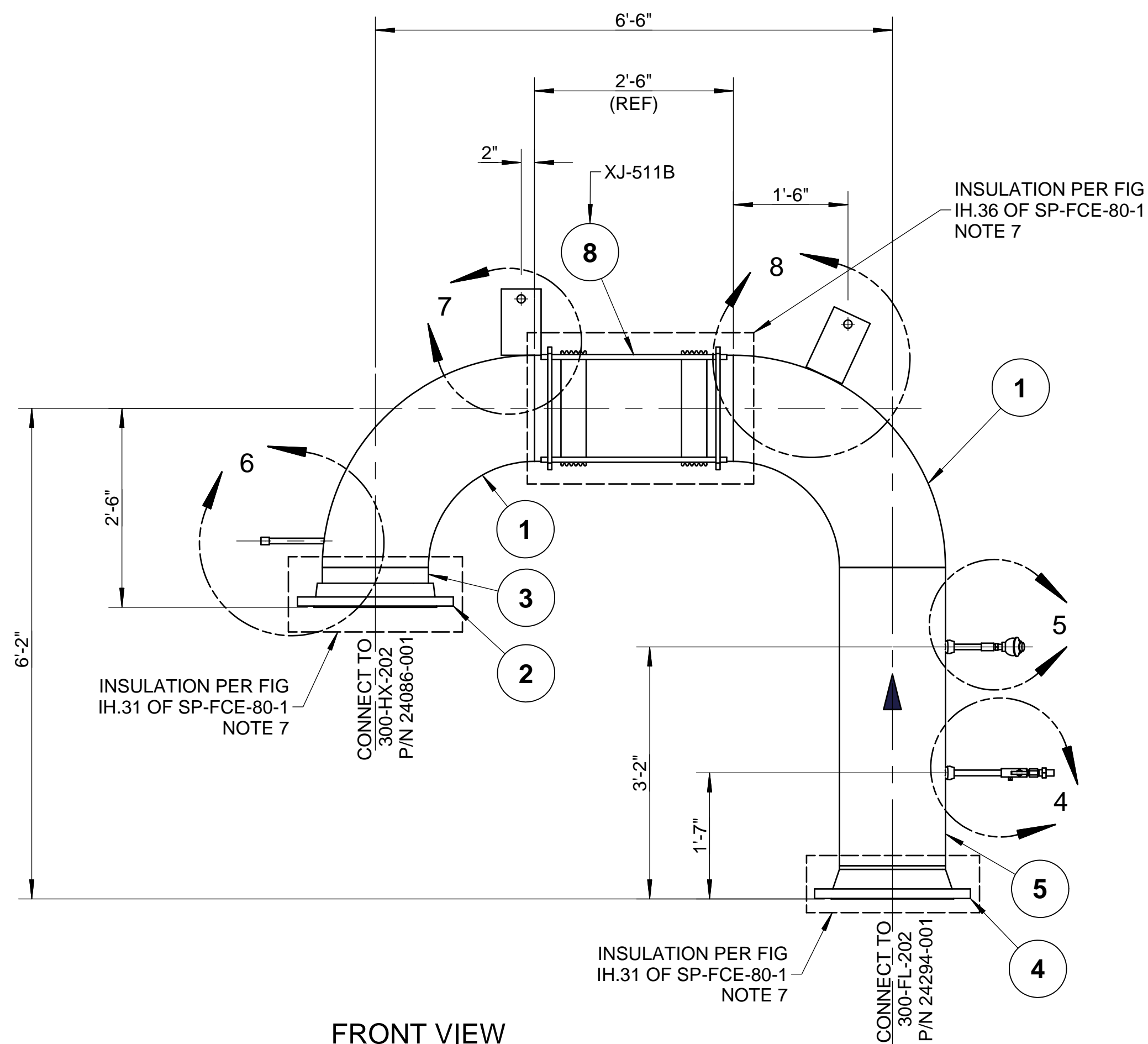
ISOMETRIC VIEW



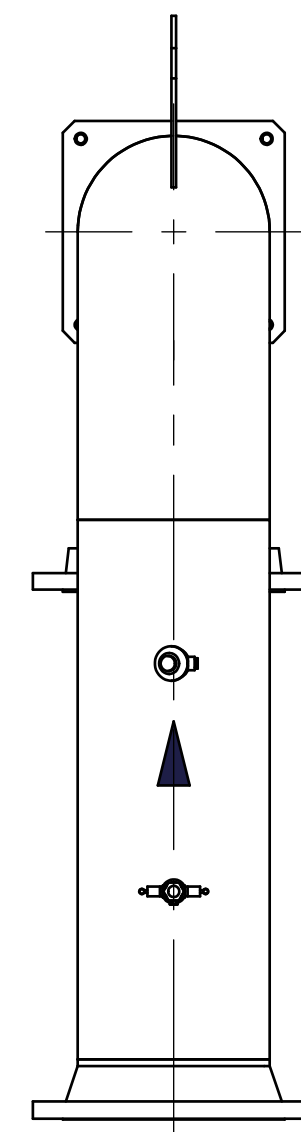
DETAIL 6  
SCALE 1 1/2"=1'-0"



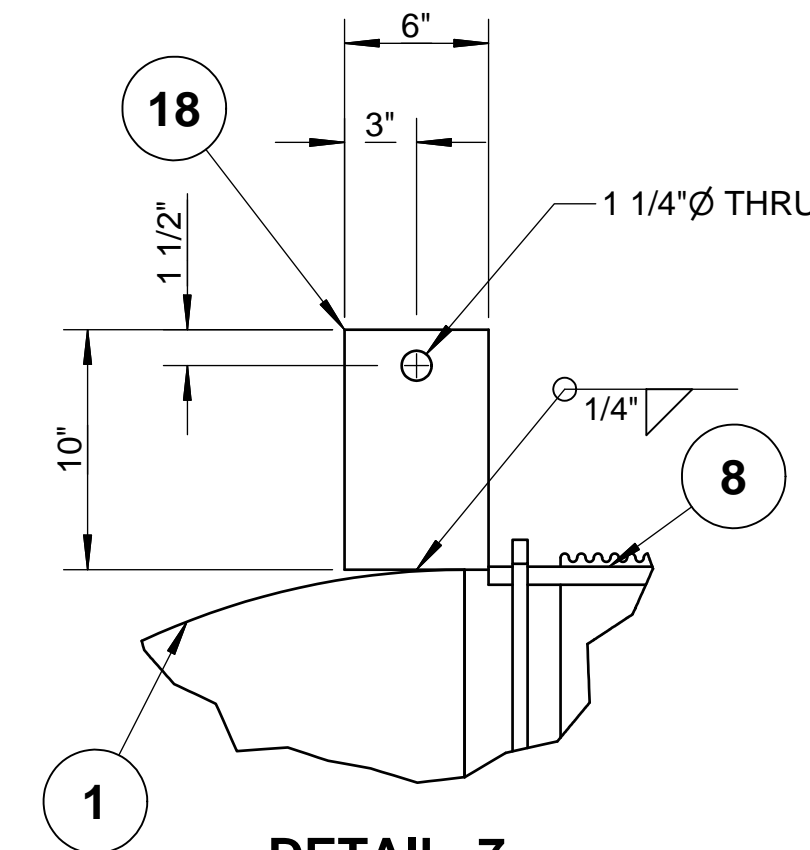
DETAIL 8  
SCALE 1 1/2"=1'-0"



FRONT VIEW  
SCALE 3/4"=1'-0"



SIDE VIEW  
SCALE 3/4"=1'-0"



DETAIL 7  
SCALE 1 1/2"=1'-0"

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. NOTE DELETED.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

**PART NUMBER: 615S-36-3004-B**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-017	2	ELL 90 DEG LR SCH10S, 16"	ASTM A403WP304/L-W
2	8682-017	1	FLG, LJ, 150#, 16"	ASTM A182F304/L
3	4615-017	1	STUB END, SCH10S, 16"	ASTM A403WP304/L-W
4	4646-017	1	FLG, WN, 150# RF, SCH10S BORE, 16"	ASTM A182F304/L
5	4520-017	3.75 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304/L
6	4605-014-005	2	PIPET (SOCKOLET), 10S x CL 3M (3000#), 10" x 1"	ASTM A182F304/L
8	24331-030	1	EXP JOINT, 16", UNIV, 30" LG.	AISI 304L
9	4522-003	0.42 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
10	8876-003	1	COUPLING, 3000#, SCR, 1/2"	ASTM A182F304/L
11	8727-025	1	THERMOCOUPLE, TYPE K, UNGRND, 1/8", 15"	AISI 304
12	4522-003	0.75 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
14	4522-003	0.67 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
15	7695-004	1	VALVE, INST, 1/2" FNPT x 1/2" MNPT	AISI 316
16	8887-005	1	ADAPTER-REDUCING 1/2" FNPT x 1/4" MNPT	AISI 316
17	24707-001	1	TRANSMITTER, PRESSURE, 1/4" FNPT, 4-20mA, 0-2 PSIG	AISI 304
18	18100-005-050	2	PLATE, 3/8, 6x10	ASTM A240-304L
19	22526-001	165 sq ft	INSULATION, 2"	MINERAL WOOL
20	20582-001	77 sq ft	JACKET, .020" THK	ALUMINUM
24	4580-003	1	CAP, 3000#, SCR, 1/2"	ASTM A182F304/L

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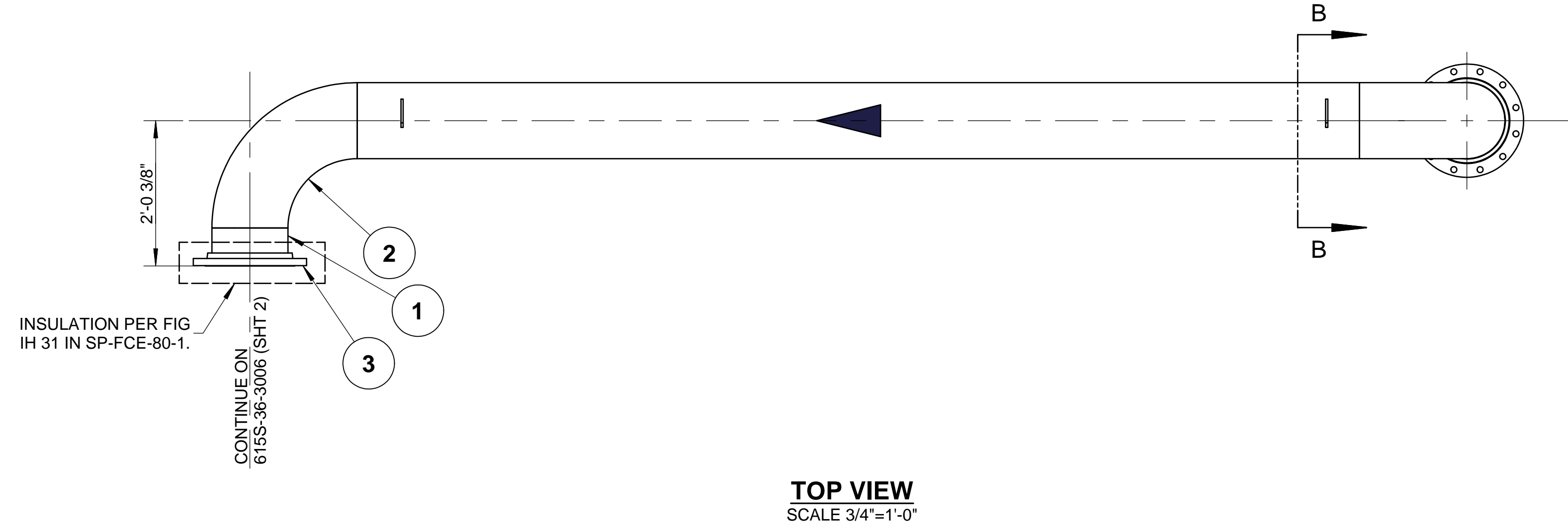
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE: **SureSource 4000 PIPING ASSEMBLY**  
LINE NO.: AG-3004-AF-16"-ih

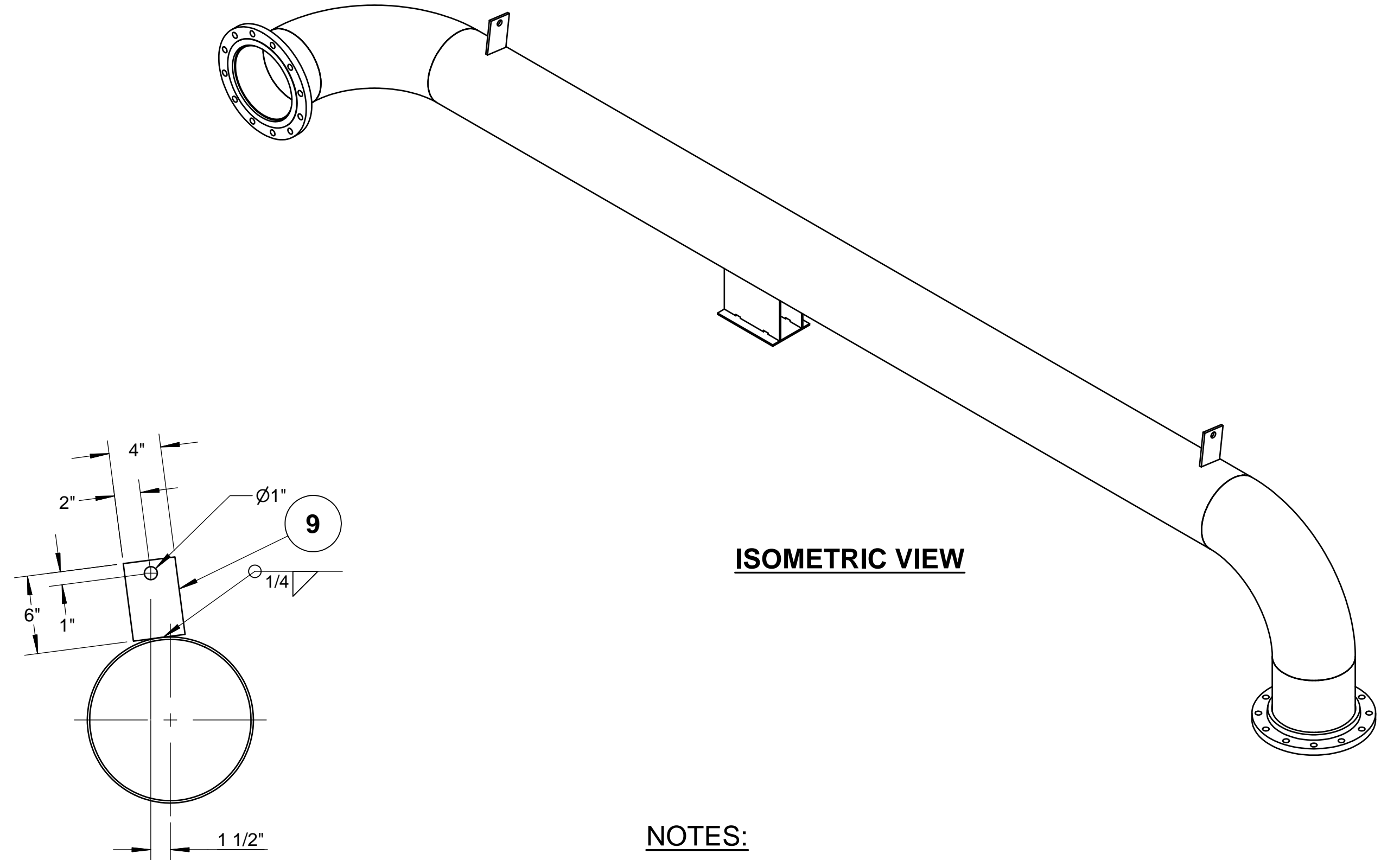
CAGE CODE: **63131**

SIZE	LOCATION	DWG NO
<b>D</b>	<b>24097</b>	<b>615S-36-3004</b>
SCALE	AS SHOWN	SHEET
		<b>2 OF 2</b>

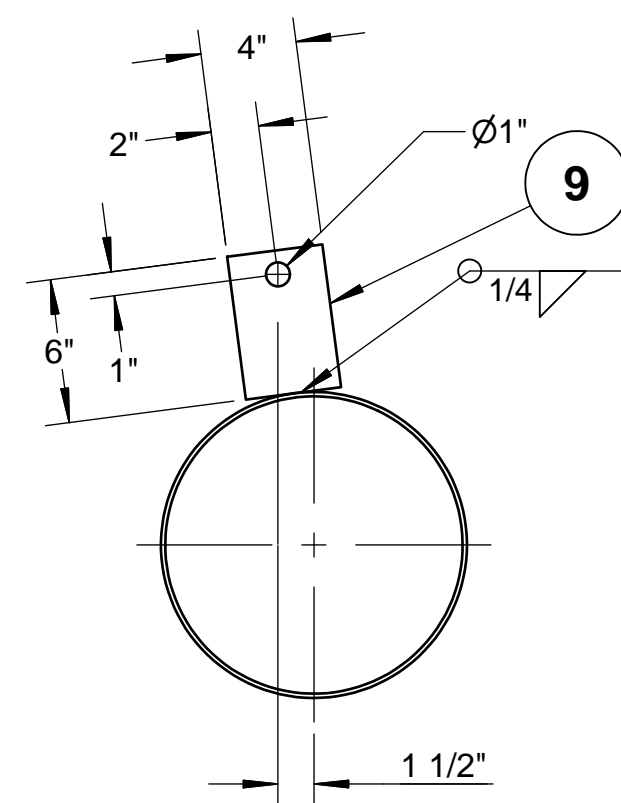
REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1270	KGG	A.BARLOW	1/30/18



**TOP VIEW**  
SCALE 3/4"=1'-0"



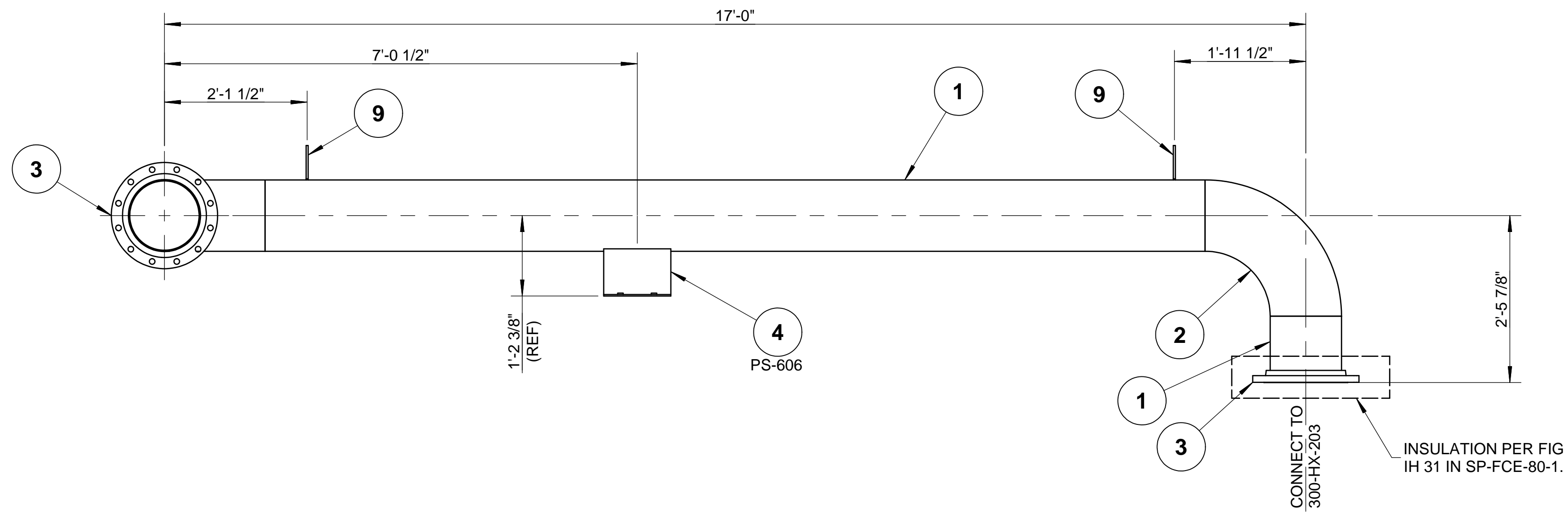
**ISOMETRIC VIEW**



**SECTION B-B**  
LIFTING LUG  
SCALE 1 1/2"=1'-0"  
(TYP)

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. INSULATION LAYERING PER LINE LIST 615S-01-02.
6. INSULATE PER SP-FCE-80-1.



**FRONT VIEW**  
SCALE 3/4"=1'-0"

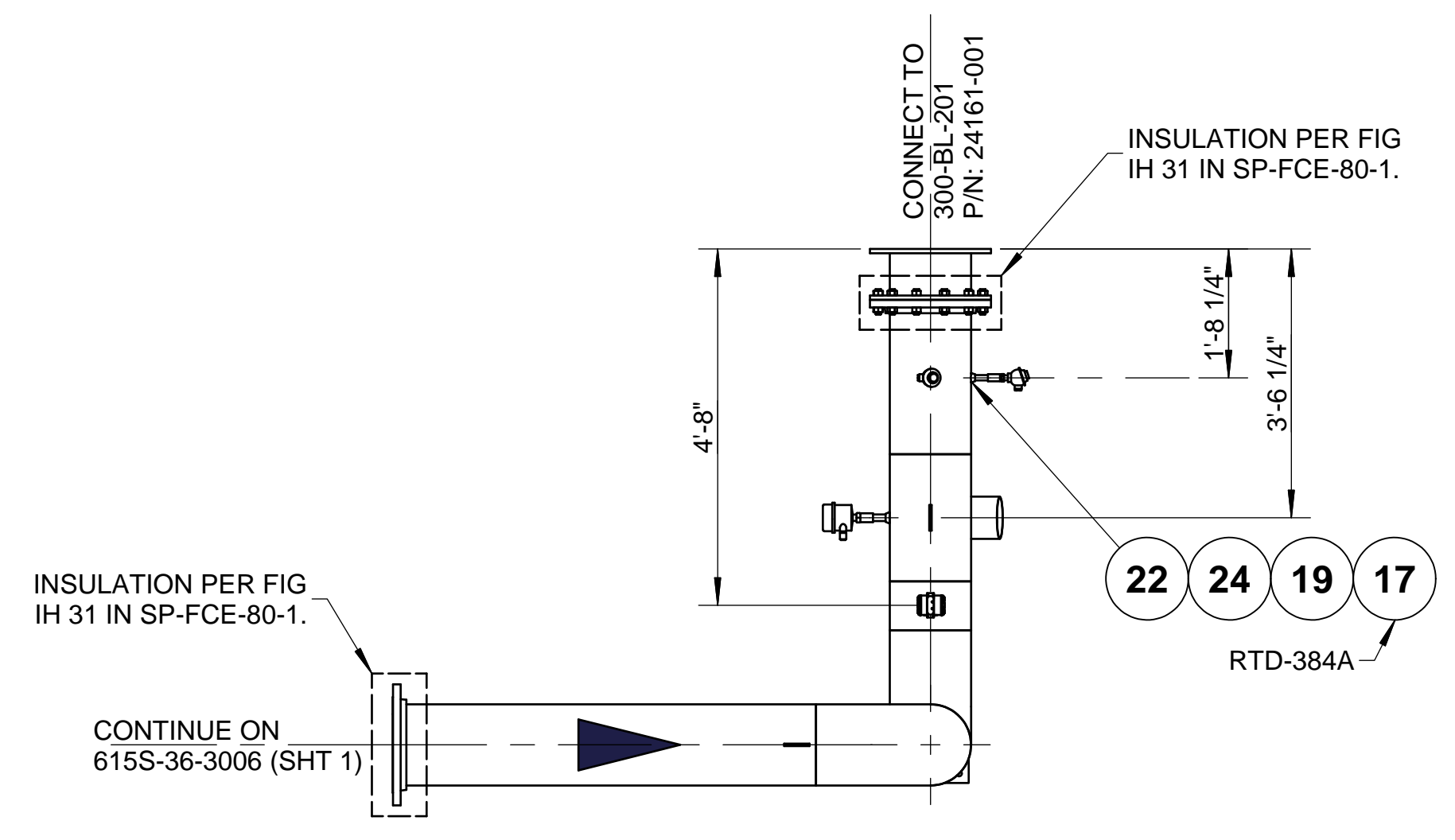
**PART NUMBER: 615S-36-3006-A**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-015	15.46 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
2	4543-015	2	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
3	4638-015	2	FLANGE, SO, 150#, RF, 12"	ASTM A182F304/L
4	25012-15-130-12-8	1	DOUBLE UPRIGHT T-SHOE, 12, S3 - INSULATION BAND SLOTS	AISI 304
5	- DELETED -			
6	- DELETED -			
7	- DELETED -			
8	- DELETED -			
9	18100-005-050	2	PLATE, 3/8, 4x6	ASTM A240-304L
10	22526-001	71 sq. ft.	INSULATION, MINERAL WOOL, 2"	MINERAL WOOL
11	20582-001	93 sq. ft.	ALJKT, 36"Wx100FT, .020"THK	3105 AL

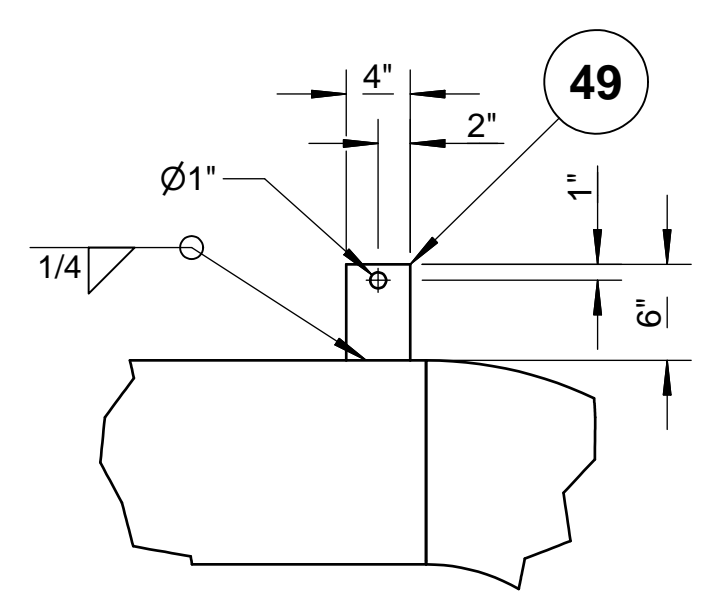
FUELCELL ENERGY, INC. PROPRIETARY THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND MAY NOT BE DISCLOSED, COPIED OR REPRODUCED EXCEPT BY WRITTEN PERMISSION FROM FUELCELL ENERGY INC.	SIGNATURES		3 Great Pasture Rd., Danbury, CT 06813	
	DRAWN: K.GROSS 05/03/17	ENGINEER: P.DHORAJIA 05/03/17		
	APPROVED: A.BARLOW 05/03/17	RELEASED: P.BEAUDOIN 05/03/17		
	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE ±1/16"			
CAGE CODE <b>63131</b>	REVISION INDICATOR FLAG NOTE	SIZE LOCATION <b>D 24097</b>	DWG NO <b>615S-36-3006</b>	
		SCALE AS SHOWN	SHEET 1 OF 2	

**SureSource 4000**  
**PIPING ASSEMBLY**  
**LINE NO.: AG-3006-AF-12"-lh**

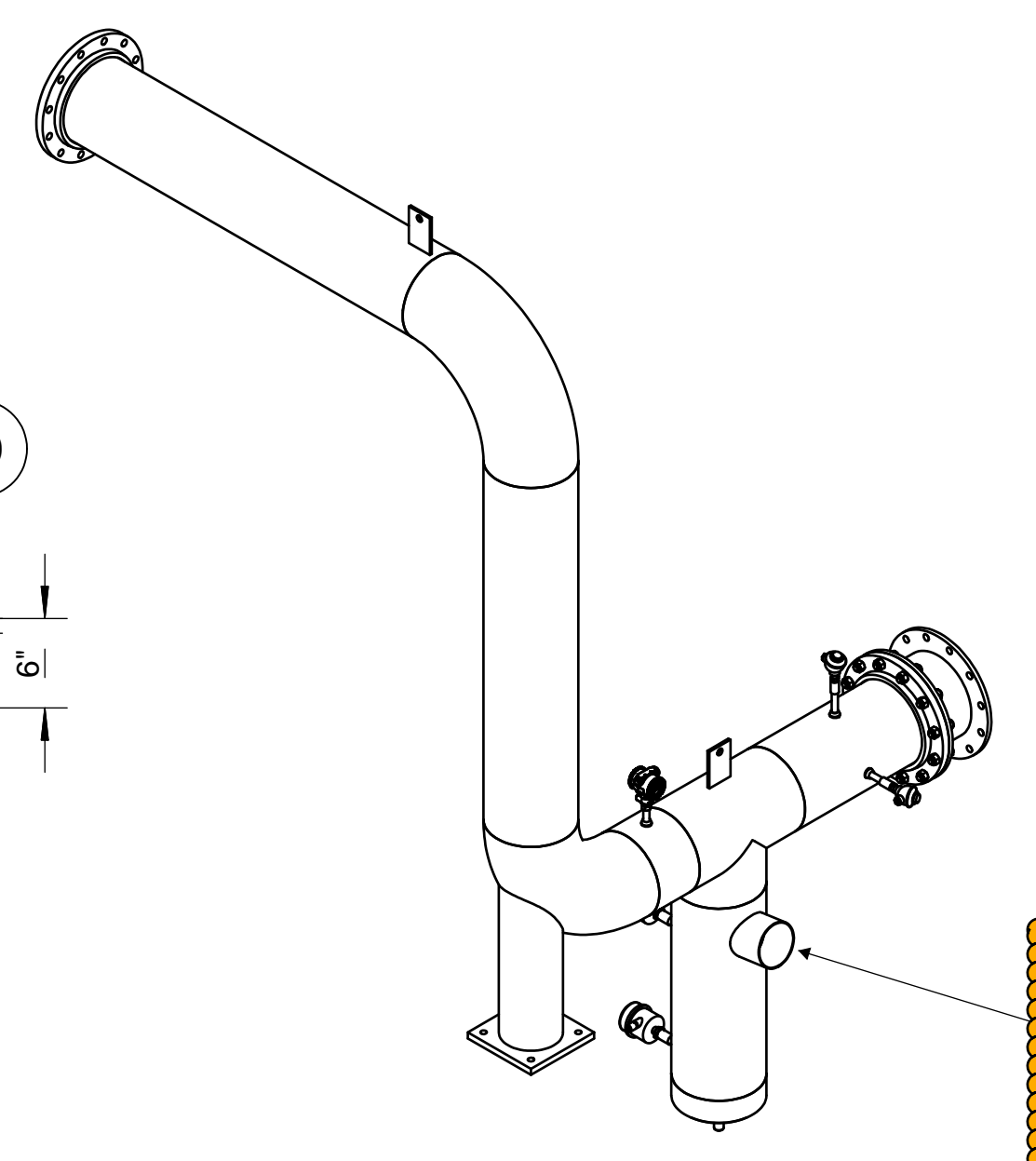




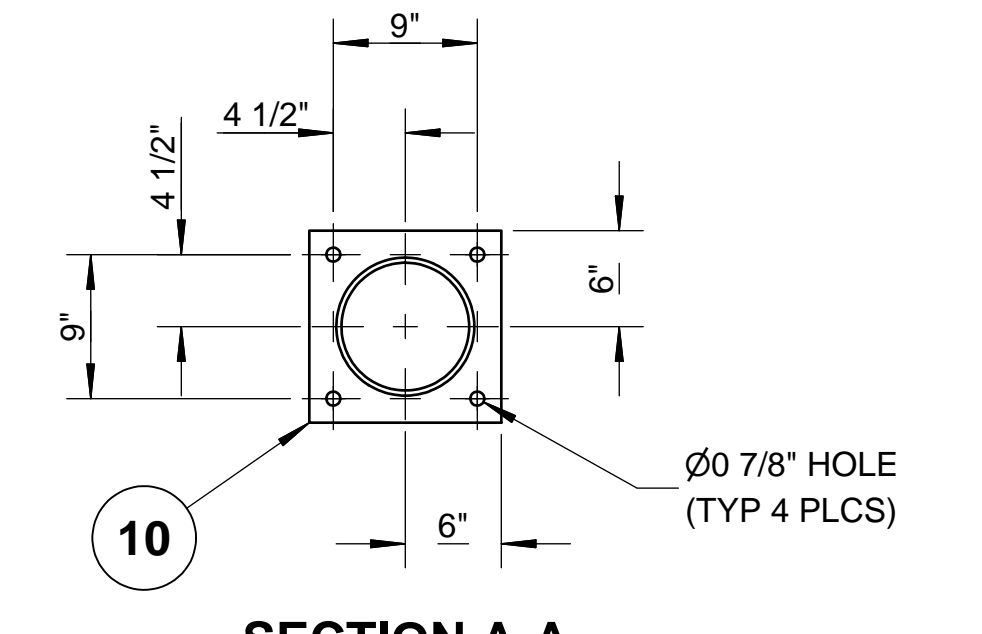
**TOP VIEW**  
SCALE 1/2"=1'-0"



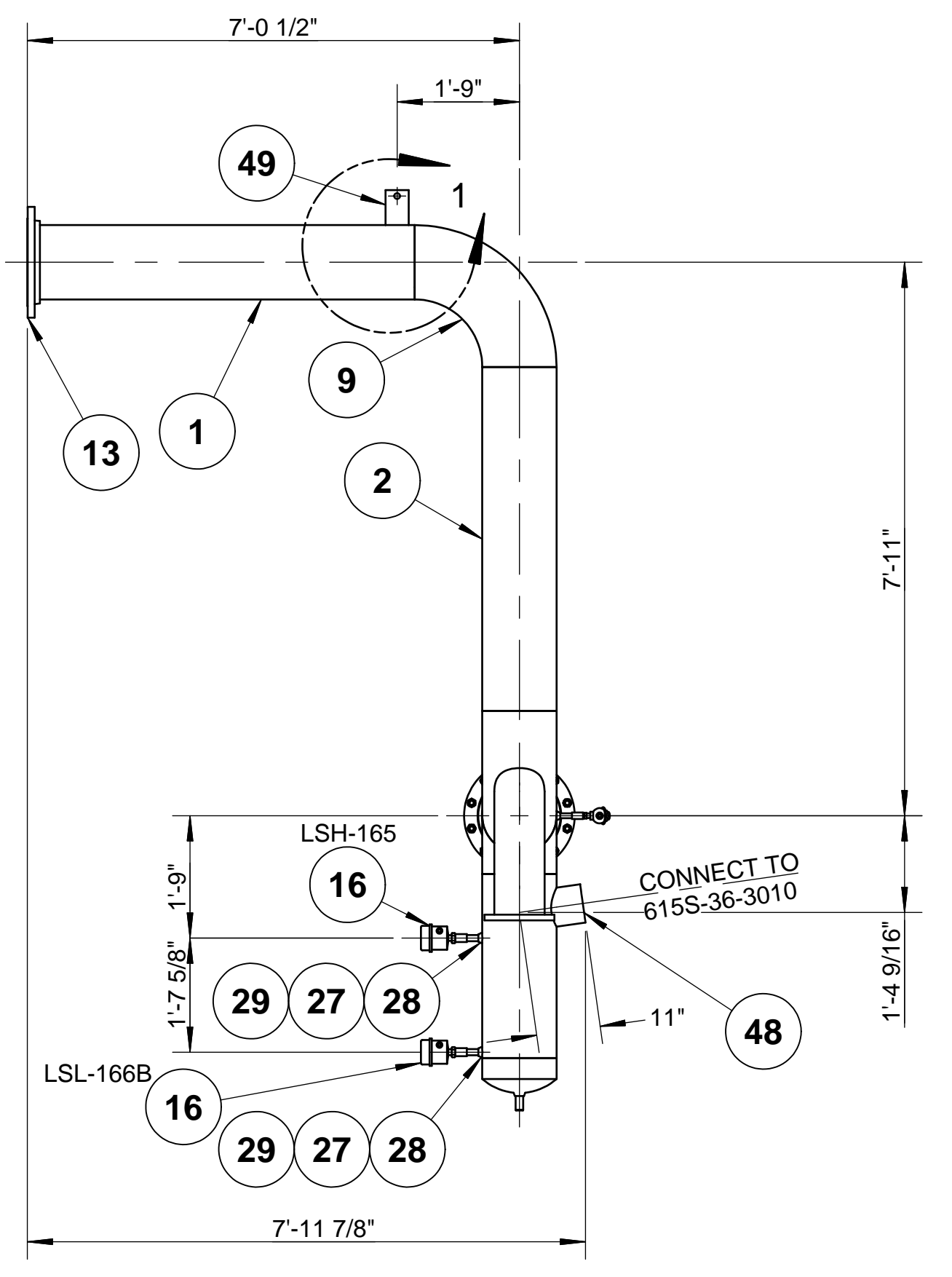
**DETAIL 1**  
LIFTING LUG  
SCALE 1" = 1'-0"  
(TYP)



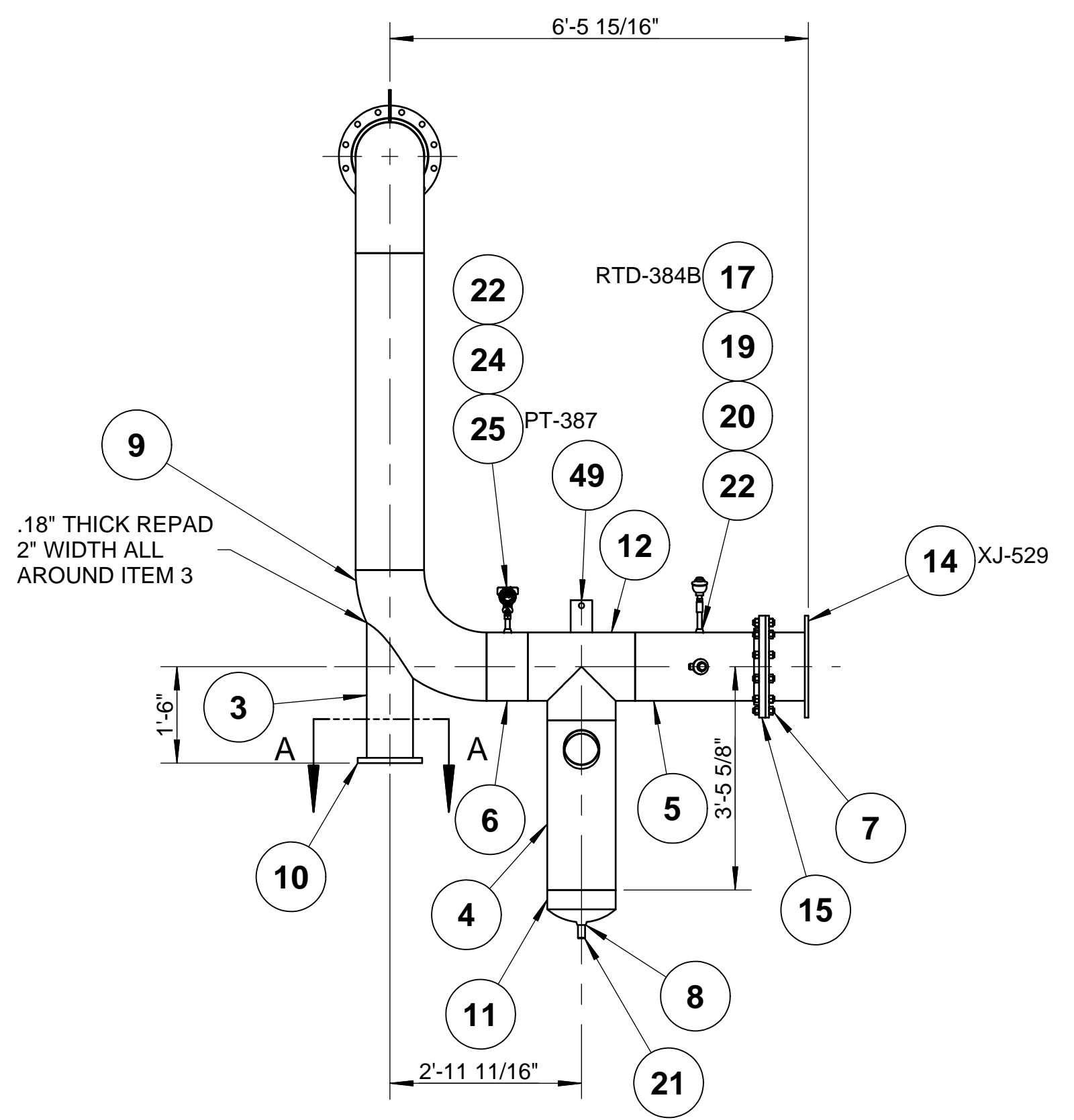
**ISOMETRIC VIEW**



**SECTION A-A**  
SCALE 1"=1'-0"



**FRONT VIEW**  
SCALE 1/2"=1'-0"



**SIDE VIEW**  
SCALE 1/2"=1'-0"

**PART NUMBER: 615S-36-3006-B**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-015	5.53 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
2	4520-015	4.92 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
3	4522-013	2.22 ft	PIPE, SCH40S, EFW, 8"	ASTM A312 TP304/L
4	4520-015	2.63 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
5	4520-015	1.99 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
6	4520-015	0.64 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
7	4751-141-064	12	BOLT-STUD W/ A194-8M HV-HX NUTS, 7/8-9 UNC, 4" LNG	ASTM A193B8M
8	4605-015-005	1	PIPET (SOCKOLET), 10S x CL 3M (3000#), 12" x 1"	ASTM A182F304/L
9	4543-015	2	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
10	18100-012-020	1	PLATE, 1, 12x12	ASTM A36
11	4587-015	1	CAP, SCH10S, 12"	ASTM A403WP304/L-W
12	4560-015	1	TEE, EQUAL, SCH10, 12"	ASTM A403WP304/L-W
13	4638-015	1	FLANGE, SO, 150#, RF, 12"	ASTM A182F304/L
14	8806-306	1	EXPANSION JT, 12" x 150# ROUND/NITRILE/NEOPRENE	NEOPRENE
15	21150-015	1	FLG, SO, 150# FF, 12"	ASTM A182F304/L
16	21316-003	2	SWITCH, LEVEL, VIBRATING FORK, UNCLASSIFIED, 6"	AISI 316
17	8727-301	2	RTD, PLATINUM, 12" LG	AISI 304
19	8876-003	2	COUPLING, 3000#, SCR, 1/2"	ASTM A182F304/L
20	4522-003	0.41 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
21	4601-005	1	NIPPLE, SCH80, SMLS, TOE, 1"	ASTM A312 TP304/L
22	4605-015-003	3	PIPET (SOCKOLET), 10S x CL 3M (3000#), 12" x 1/2"	ASTM A182F304/L
24	4601-003	2	NIPPLE, SCH80, SMLS, TOE, 1/2"	ASTM A312 TP304/L
25	7703-231	1	XMTR, GUAGE, PRESS, -1 TO 2 PSIG	18-8 SS
27	4522-004	0.50 ft	PIPE, SCH40S, EFW, 3/4"	ASTM A312 TP304/L
28	4605-015-004	2	PIPET (SOCKOLET), 10S x CL 3M (3000#), 12" x 3/4"	ASTM A182F304/L
29	8876-004	2	COUPLING, 3000#, SCR, 3/4"	ASTM A182F304/L
48	4520-012	0.50 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304/L
49	18100-005-050	2	PLATE, 3/8, 4x6	ASTM A240-304L
50	22526-001	71 sq. ft.	INSULATION, MINERAL WOOL, 2"	MINERAL WOOL
51	20582-001	93 sq. ft.	ALJKT, 36"Wx100FT, .020" THK	3105 AL

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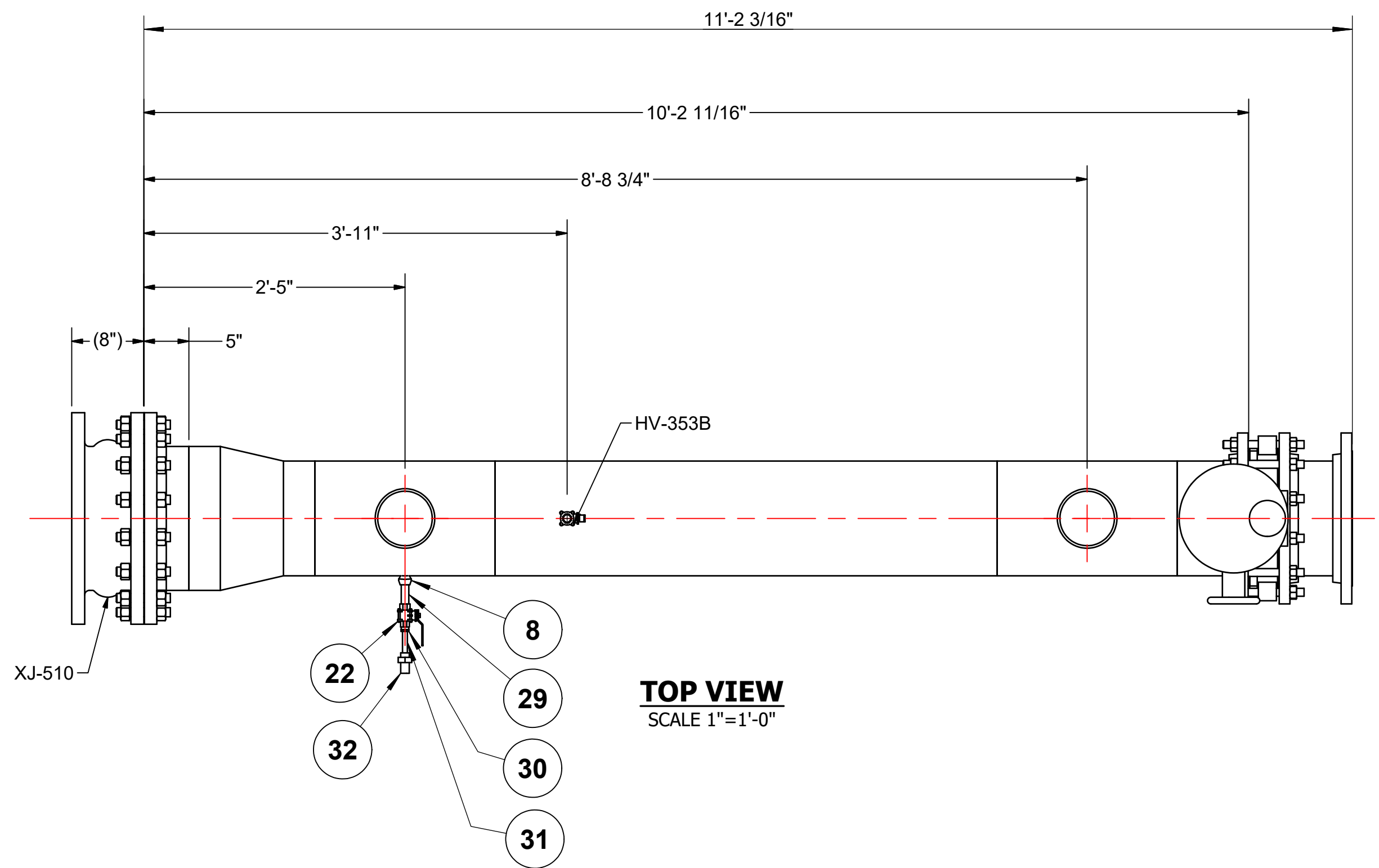
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE: **SureSource 4000 PIPING ASSEMBLY**  
LINE NO.: AG-3006-AF-12"-lh

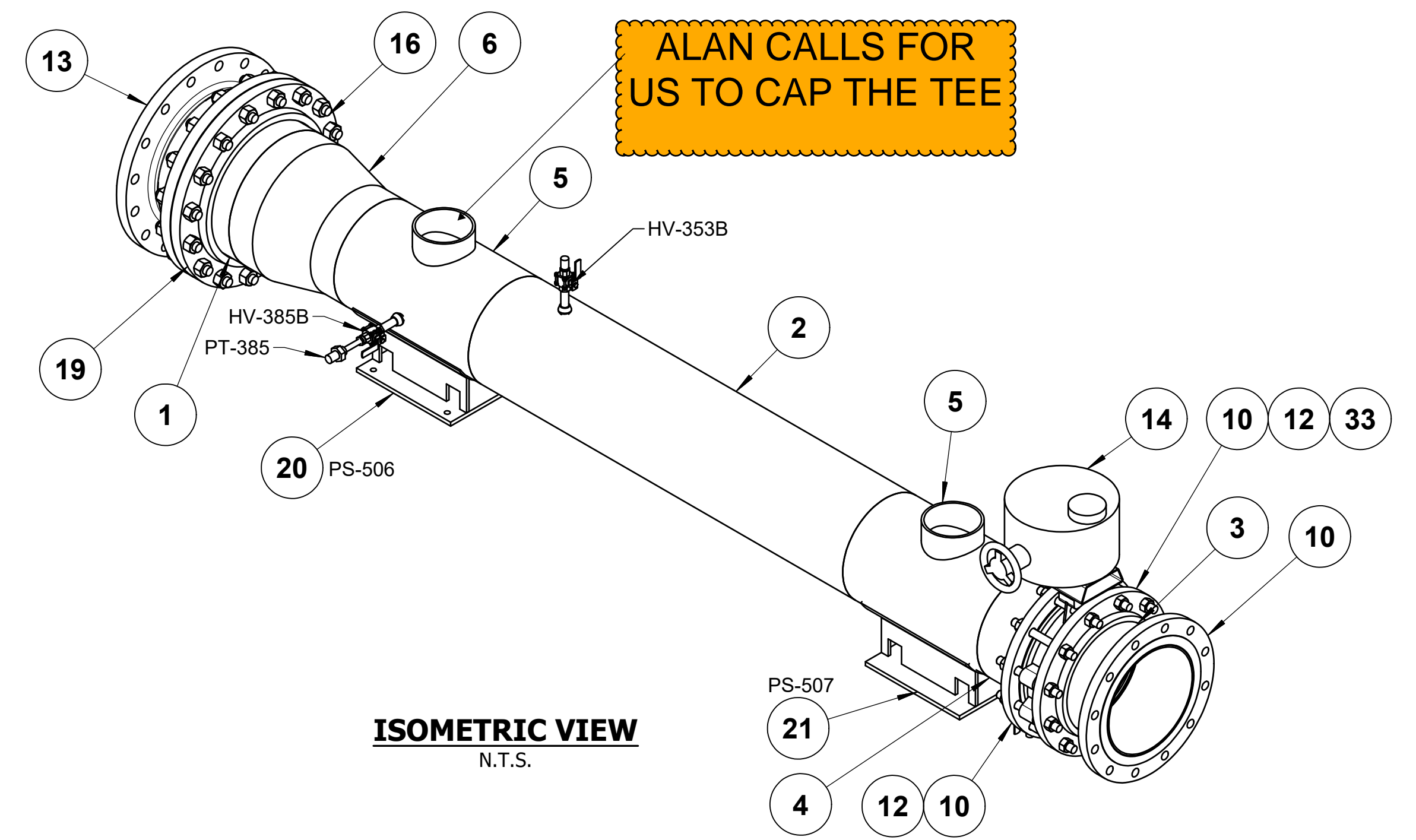
SIZE: **D** LOCATION: **24097** DWG NO: **615S-36-3006** A

CAGE CODE: **63131** SCALE: AS SHOWN SHEET: 2 OF 2

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1307	KP	A.BARLOW	4/3/2018



**TOP VIEW**  
SCALE 1"=1'-0"

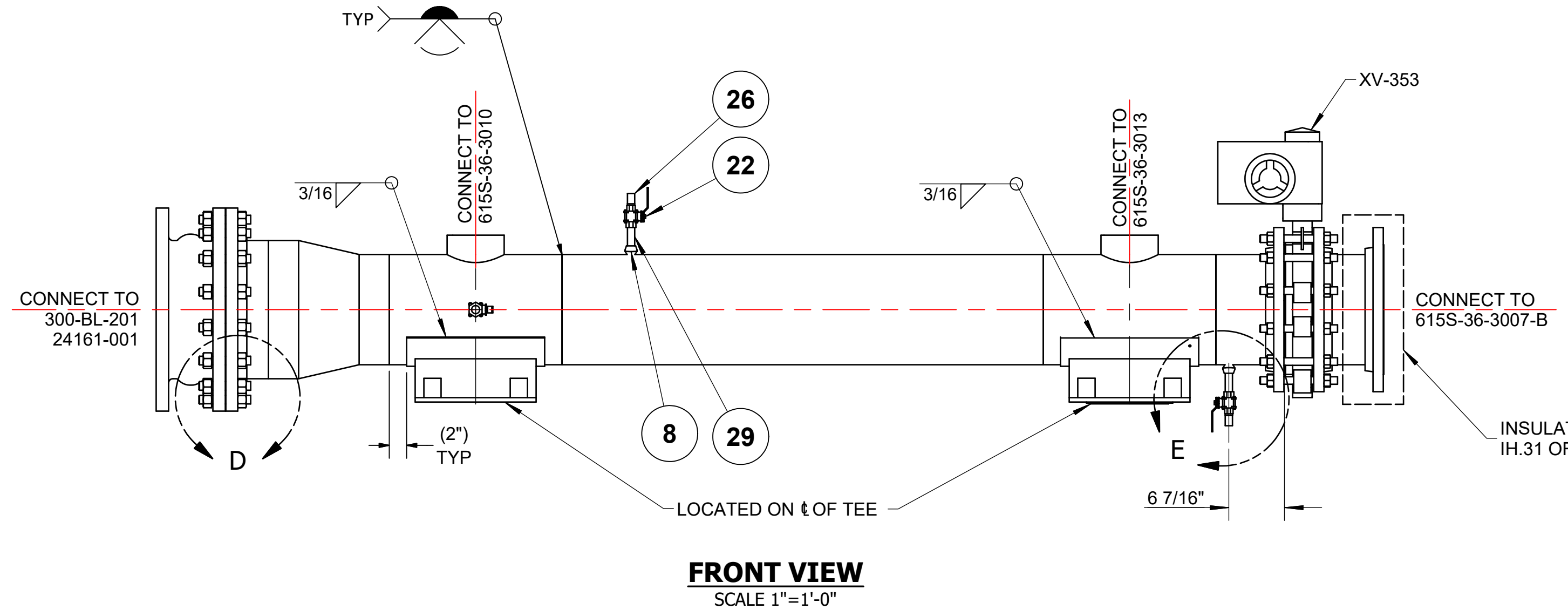


**ISOMETRIC VIEW**  
N.T.S.

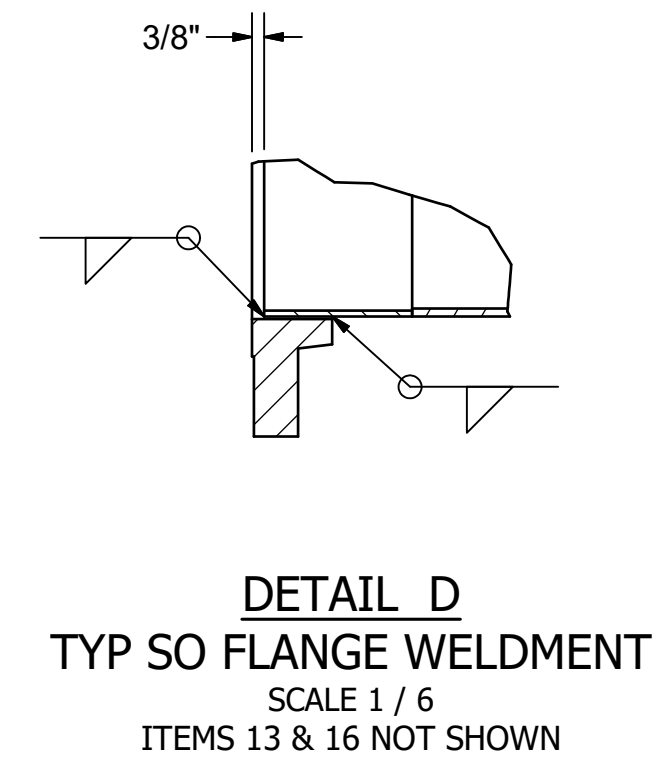
ALAN CALLS FOR US TO CAP THE TEE

PART NUMBER: 615S-36-3007-A

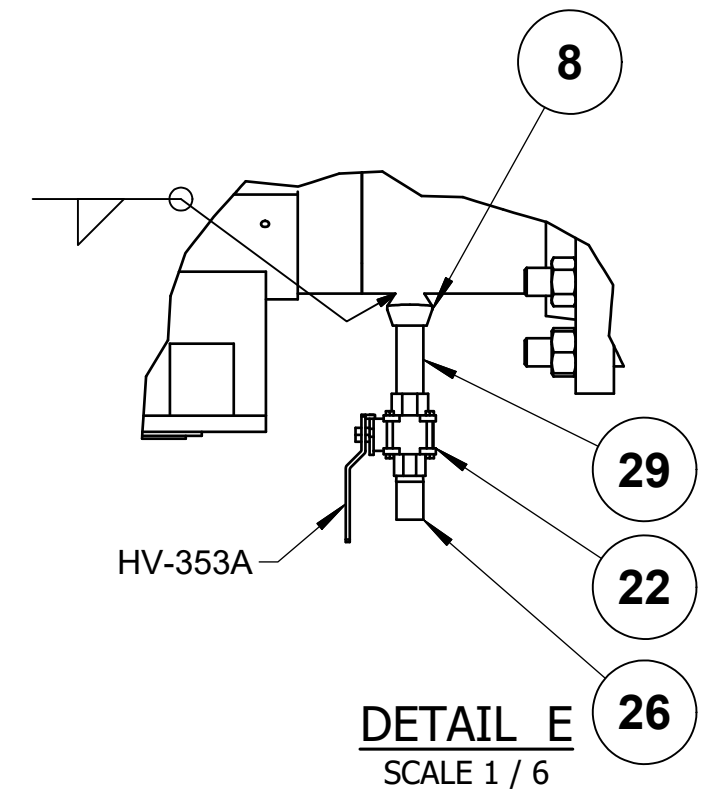
LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-017	0.39 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304H/L
2	4520-015	4.65 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304H/L
3	4520-015	0.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
4	4520-015	0.65 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
5	4808-015-012	2	TEE, REDUCING, SCH10S, 12" x 6"	ASTM A403WP304/L-W
6	4567-017-015	1	REDUCER, CON, SCH10S 16" x 12"	ASTM A403WP304/L-W
8	4605-015-003	3	PIPET (SOCKET), 10S x CL 3M (3000#), 12" x 1/2"	ASTM A182F304/L
10	4638-015	3	FLANGE, SO, 150#, RF, 12"	ASTM A182F304/L
12	8766-015	2	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 12"	
13	8806-308	1	EXPANSION JOINT, 16" FLG X 8" LG	Rubber
14	23880-004	1	VALVE, 12" BUTTERFLY ASSY, SS, ISOLATION ELECTRIC ACTUATED	AISI 304
16	7567-161-096	16	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 1-8 UNC, 6" LNG	ASTM A193 GR. B7
19	9267-017	1	FLG, SO, 150# FF, 16"	ASTM A182F304/L
20	24923-100	1	PIPE SUPPORT, CUSTOM FABRICATED, SS400, PS-506	
21	24923-200	1	PIPE SUPPORT, CUSTOM FABRICATED, SS4000, PS-507	
22	21957-003	3	BALL 300# SWXSCR SS316-TRM MTL-ST FP HDL-OP	STAINLESS STEEL, ASME SA-182 F316
23	- DELETED -	- DELETED -	- DELETED -	
24	- DELETED -	- DELETED -	- DELETED -	
25	- DELETED -	- DELETED -	- DELETED -	
26	4608-003	2	PLUG, ROUND HEAD, SCR, 1/2"	ASTM A182F304/L
27	22526-001	41 sq ft	INSULATION, 2"	MINERAL WOOL
28	20582-001	54 sq ft	JACKET, .020" THK	ALUMINUM
29	4522-003	0.75 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
30	7568-003-001	1	BUSHING, HEX HEAD, SCR, 1/2" x 1/4"	ASTM A182F304/L
31	8897-001	1	NIPPLE, SCH80, SMLS, TBE, 1/4"	ASTM A312 TP304/L
32	24707-002	1	TRANSMITTER, PRESSURE, 1/4" FNPT, 4-20mA, 0-4 PSIG	AISI 304
33	7567-141-144	12	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 7/8-9 UNC, 9" LNG	ASTM A193 GR. B7



**FRONT VIEW**  
SCALE 1"=1'-0"



**DETAIL D**  
TYP SO FLANGE WELDMENT  
SCALE 1/6  
ITEMS 13 & 16 NOT SHOWN

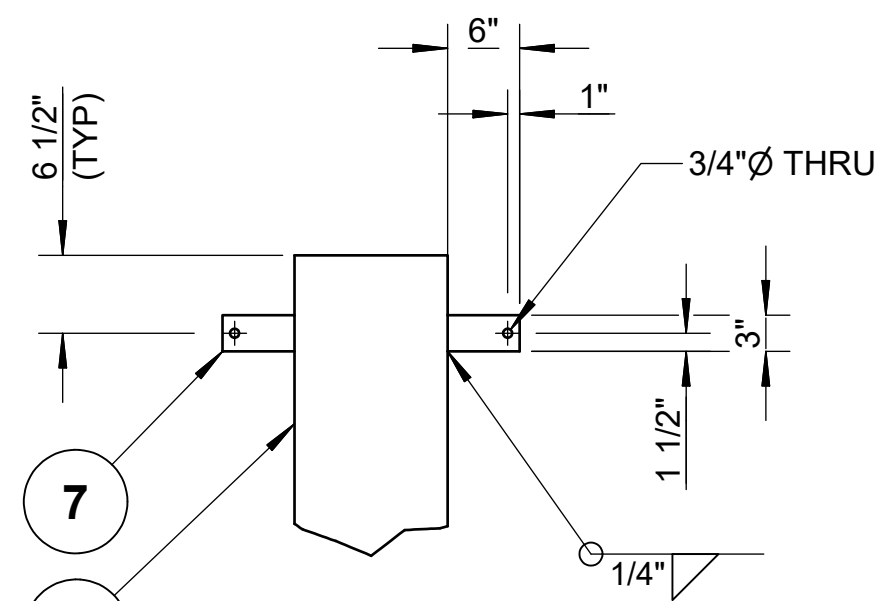


**DETAIL E**  
SCALE 1/6

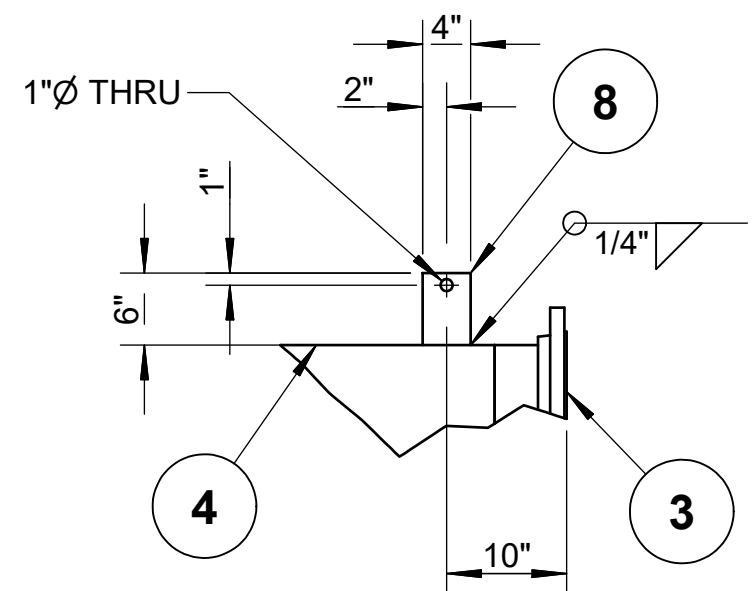
**NOTES:**

1. MATERIALS OF FABRICATION PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIALS.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATE PER SP-FCE-80-1.

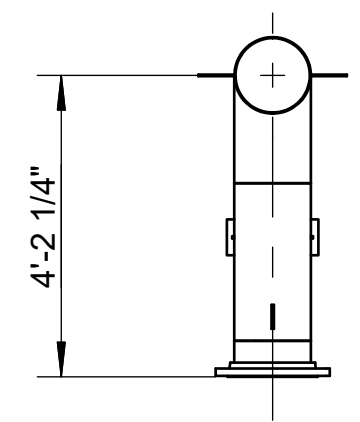
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	DRAWN: K.PERSICO 11/23/16 ENGINEER: P.DJORAJIA 11/23/16 APPROVED: A.BARLOW 11/23/16 RELEASED: A.HADJIS 11/23/16 UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"	TITLE: SureSource 4000 PIPING ASSEMBLY LINE NO.: AG-3007-AF-12"-ih	
CAGE CODE: 63131	REVISION INDICATOR: D	SCALE: 24064	DWG NO: 615S-36-3007
FLAG NOTE	AS SHOWN	SHEET: 1 OF 3	



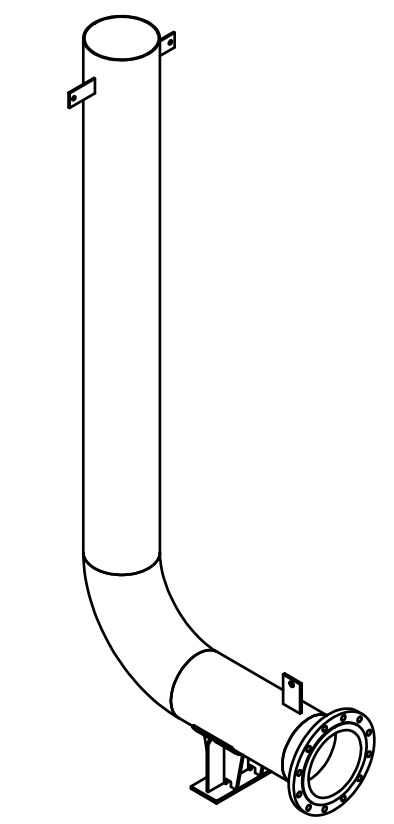
**DETAIL 1**  
SCALE 3/4" = 1'-0"



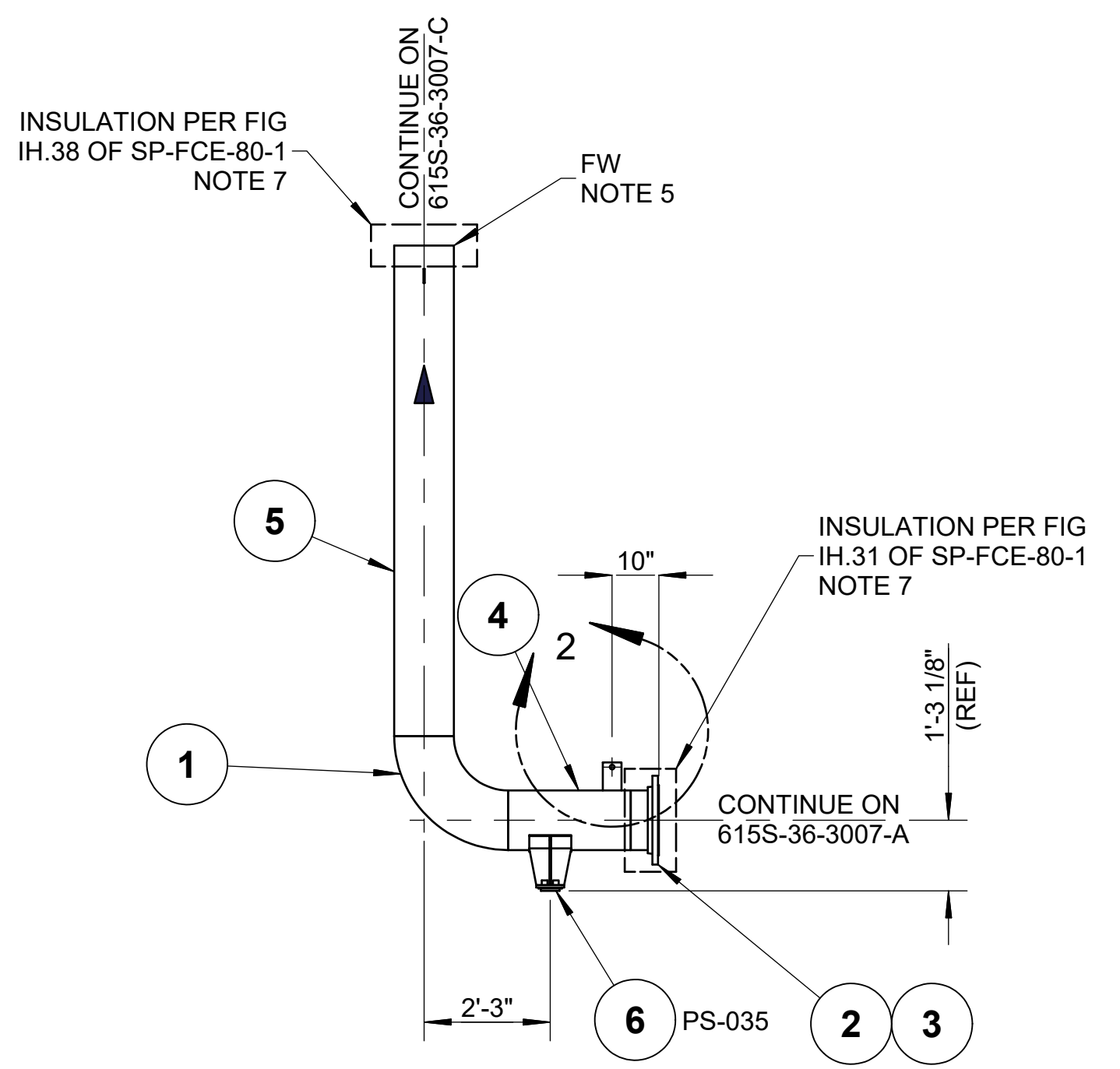
**DETAIL 2**  
SCALE 3/4" = 1'-0"



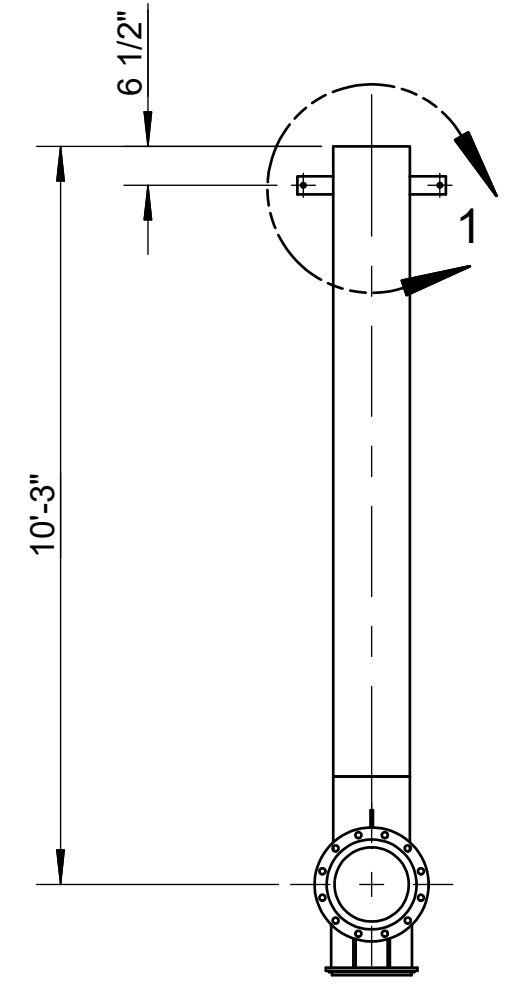
**TOP VIEW**  
SCALE 3/8" = 1'-0"



**ISOMETRIC VIEW**



**SIDE VIEW**  
SCALE 3/8" = 1'-0"



**FRONT VIEW**  
SCALE 3/8" = 1'-0"

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

**PART NUMBER: 615S-36-3007-B**

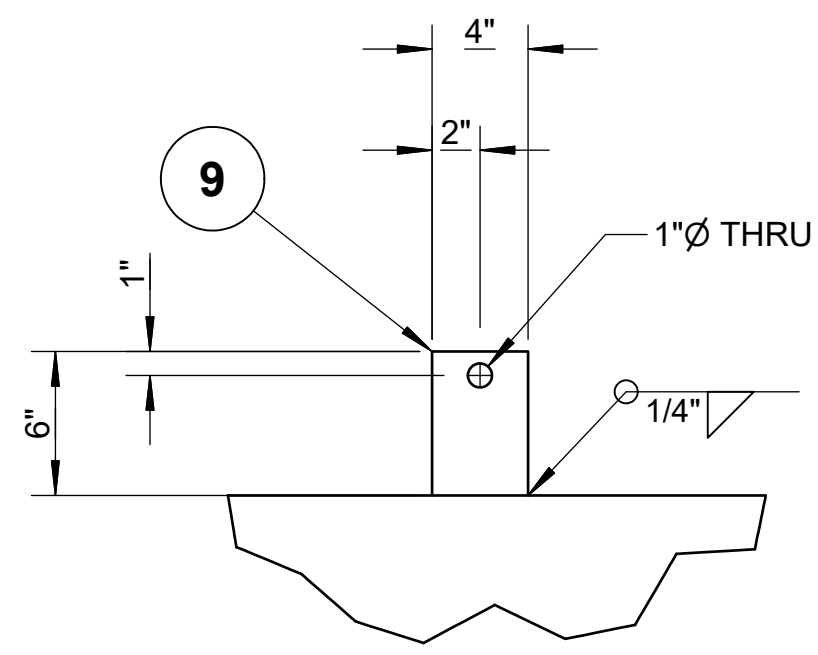
LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-015	1	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
2	8682-015	1	FLG, LJ, 150#, 12"	ASTM A182F304/L
3	4615-015	1	STUB END, SCH10S, 12"	ASTM A403WP304/L-W
4	4520-015	2.19 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
5	4520-015	8.75 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
6	25115-15-135-6-8	1	HEAVY DUTY SADDLE, 12", AISI 304, INSULATION BAND SLOT, GRAPHITE ON GRAPHITE, 6" LNG, 8" BOP	AISI 304
7	18100-003-050	2	PLATE, 1/4, 3x6	ASTM A240-304L
8	18100-005-050	1	PLATE, 3/8, 4x6	ASTM A240-304L
9	22526-001	46 sq ft	INSULATION, 2"	MINERAL WOOL
10	20582-001	61 sq ft	JACKET, .020" THK	ALUMINUM

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CAGE CODE  
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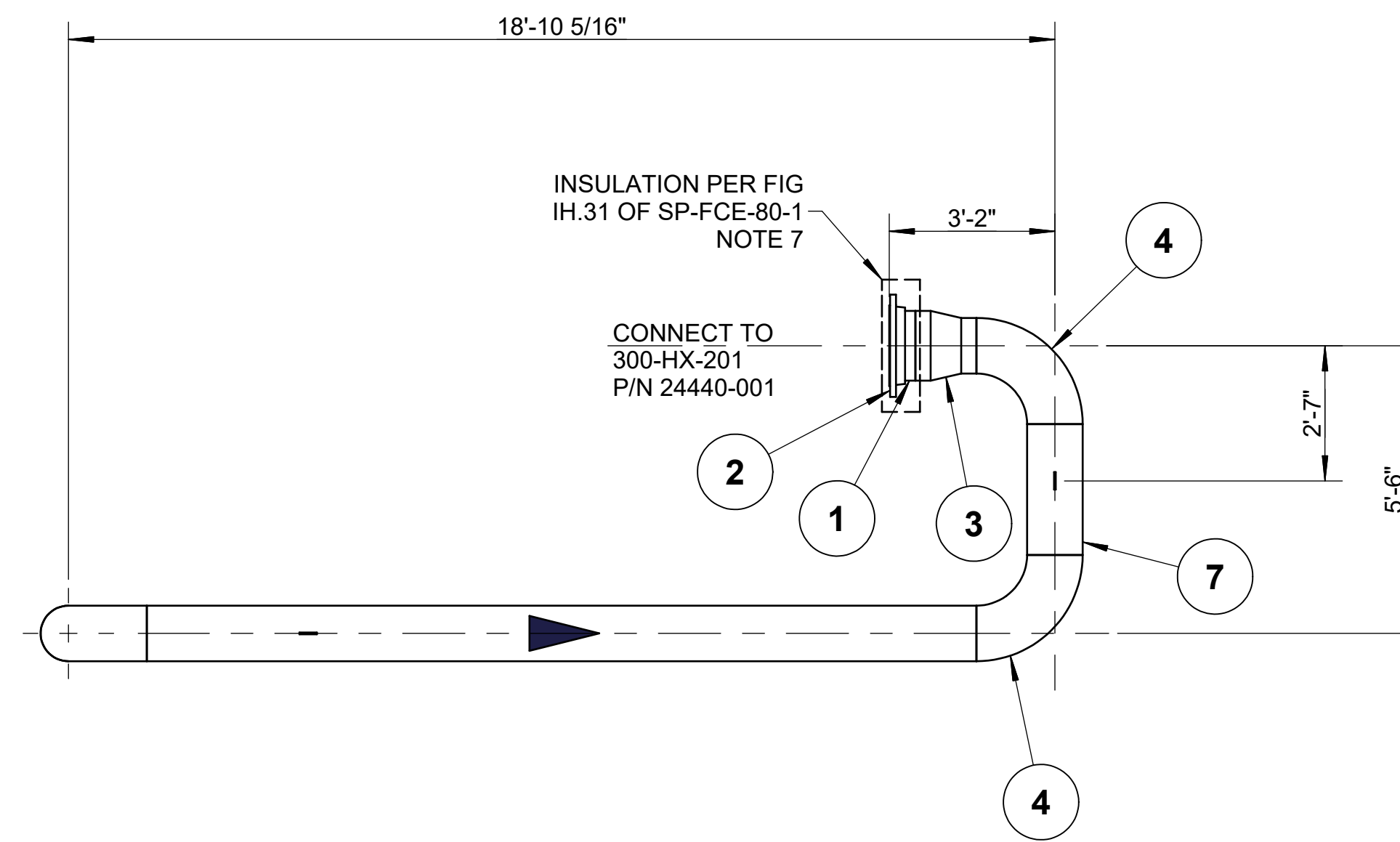
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO.: AG-3007-AF-12"-ih**

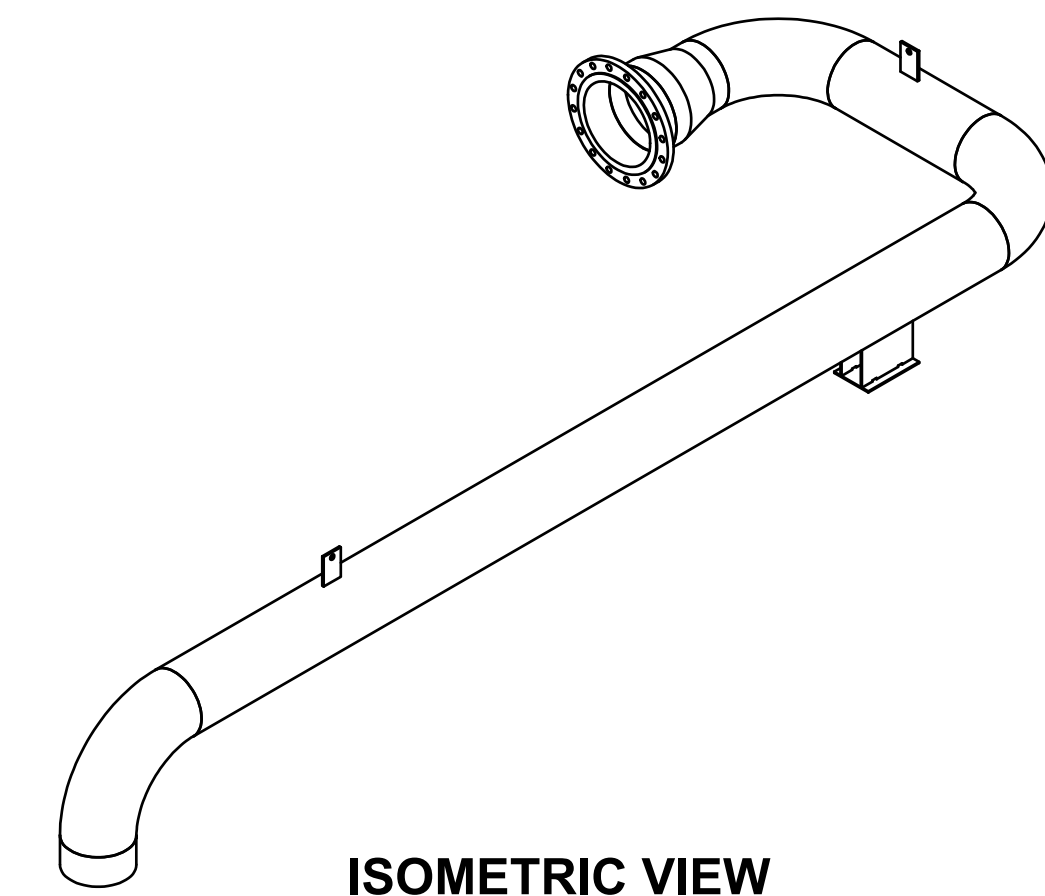
SIZE	LOCATION	DWG NO	
<b>D</b>	<b>24097</b>	<b>615S-36-3007</b>	<b>A</b>
SCALE	AS SHOWN	SHEET	2 OF 3



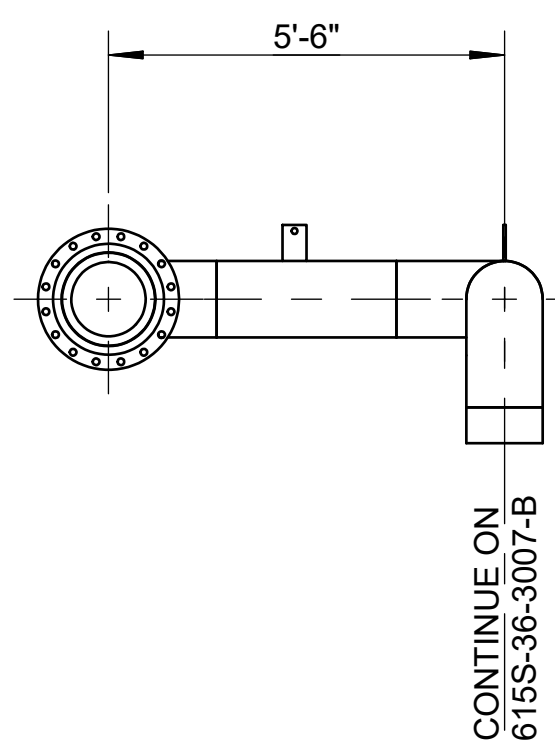
**DETAIL 1**  
SCALE 1 1/2" = 1'-0"  
(2 PLACES)



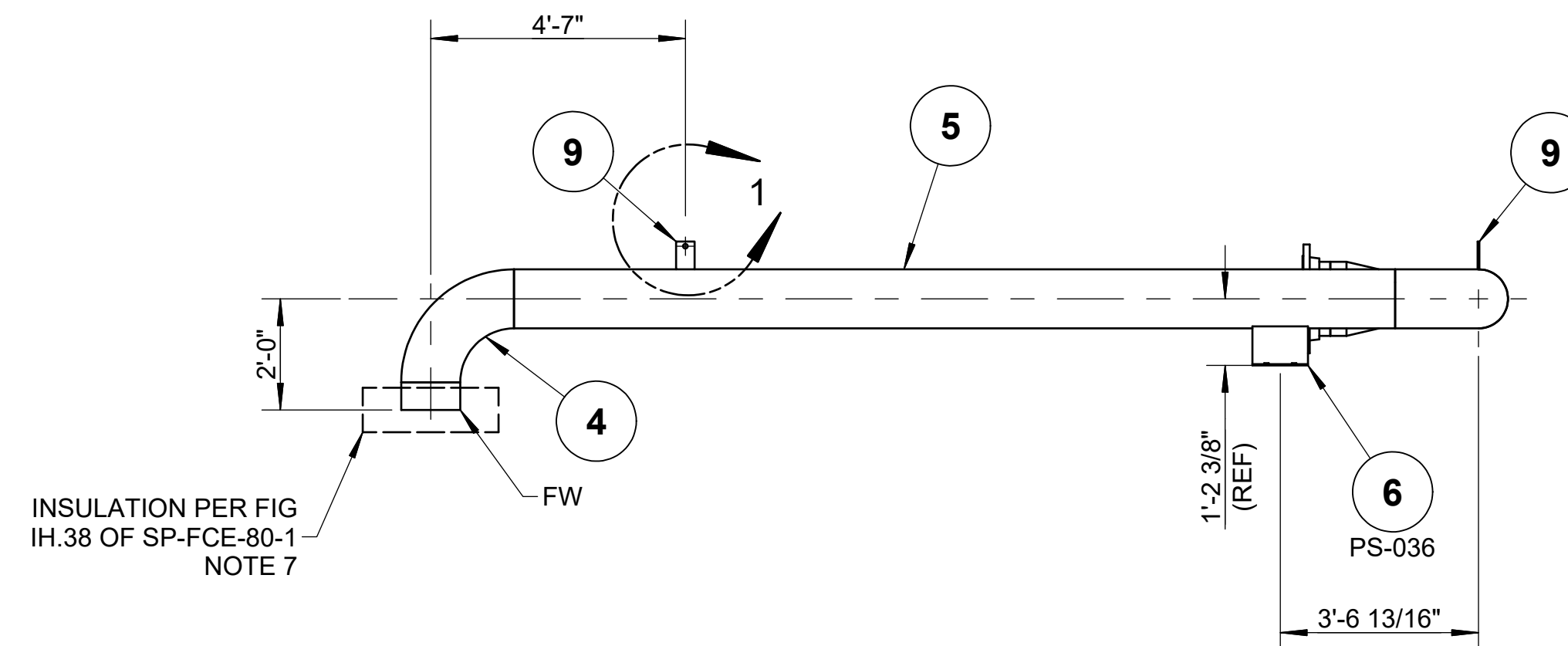
**TOP VIEW**  
SCALE 3/8" = 1'-0"



**ISOMETRIC VIEW**



**SIDE VIEW**  
SCALE 3/8" = 1'-0"



**FRONT VIEW**  
SCALE 3/8" = 1'-0"

**PART NUMBER: 615S-36-3007-C**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4615-017	1	STUB END, SCH10S, 16"	ASTM A403WP304/L-W
2	8682-017	1	FLG, LJ, 150#, 16"	ASTM A182F304/L
3	4567-017-015	1	REDUCER, CON, SCH10S 16" x 12"	ASTM A403WP304/L-W
4	4543-015	3	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
5	4520-015	15.86 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
6	25012-15-130-12-8	1	DOUBLE UPRIGHT T-SHOE, 12, S3 - INSULATION BAND SLOTS	AISI 304
7	4520-015	2.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
8	4520-015	0.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
9	18100-005-050	2	PLATE, 3/8, 4x6	ASTM A240-304L
10	22526-001	95 sq ft	INSULATION, 2"	MINERAL WOOL
11	20582-001	125 sq ft	JACKET, .020" THK	ALUMINUM

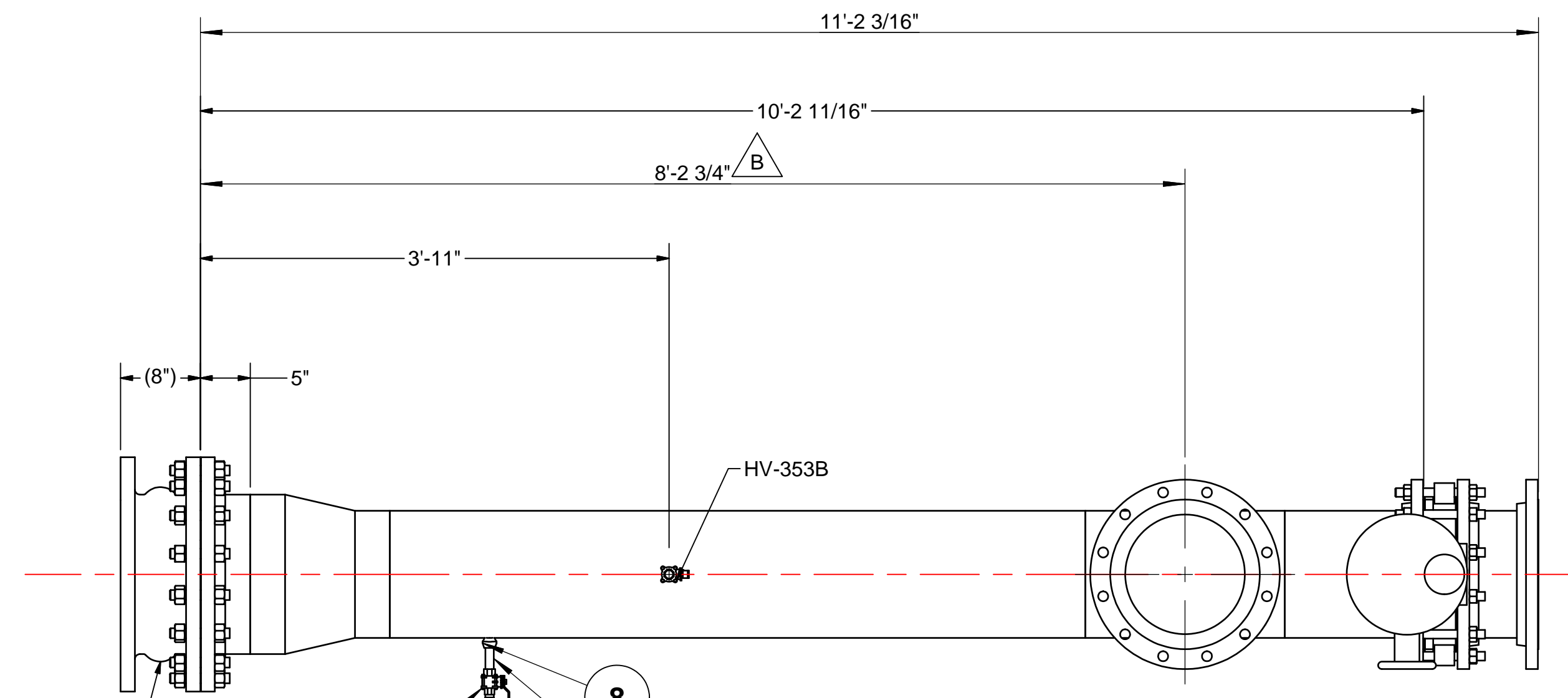
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CAGE CODE  
**63131**

**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

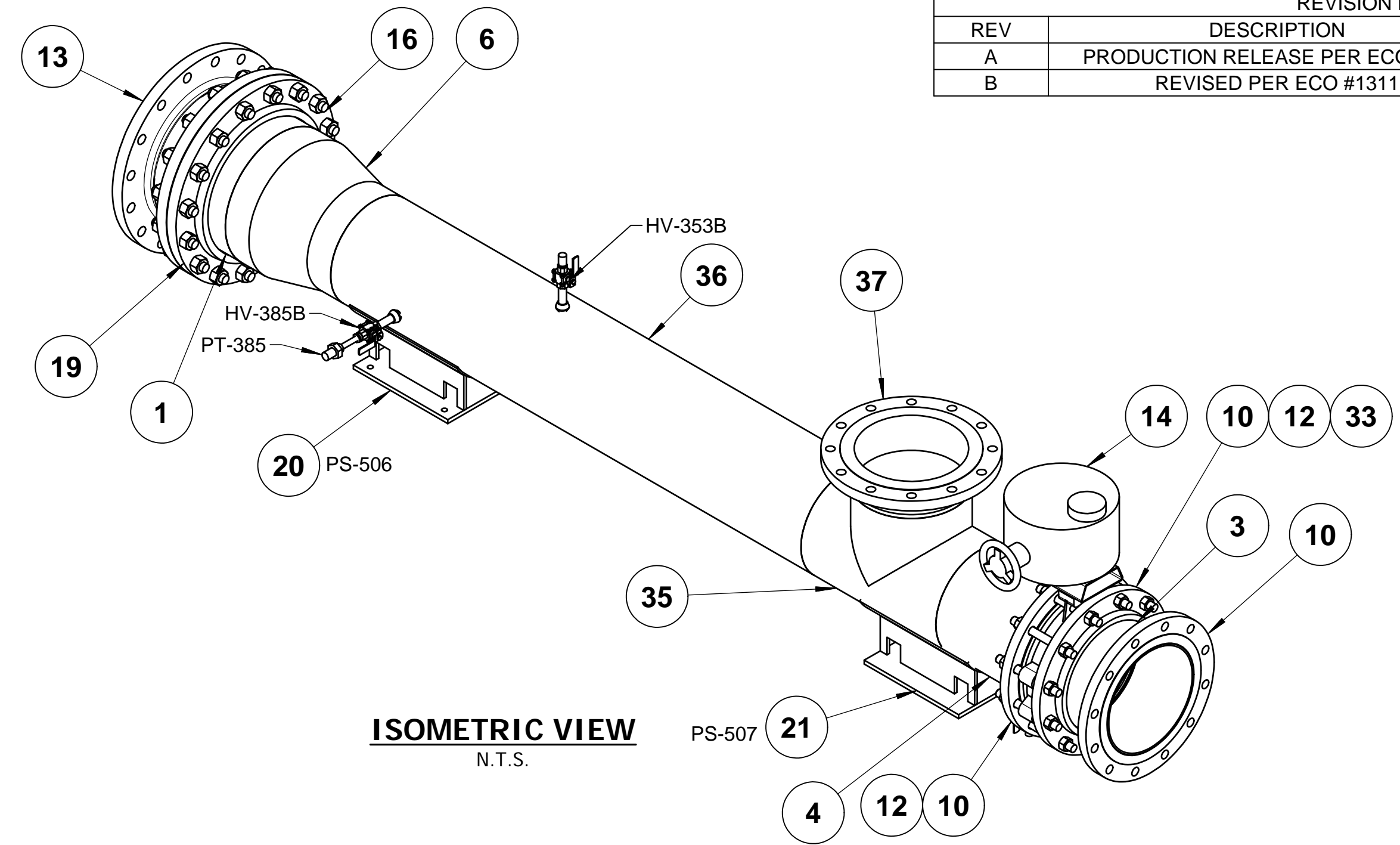
TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO. AG-3007-AF-12"-lh**

SIZE	LOCATION	DWG NO	
<b>D</b>	<b>24097</b>	<b>615S-36-3007</b>	<b>A</b>
SCALE	AS NOTED	SHEET	3 OF 3

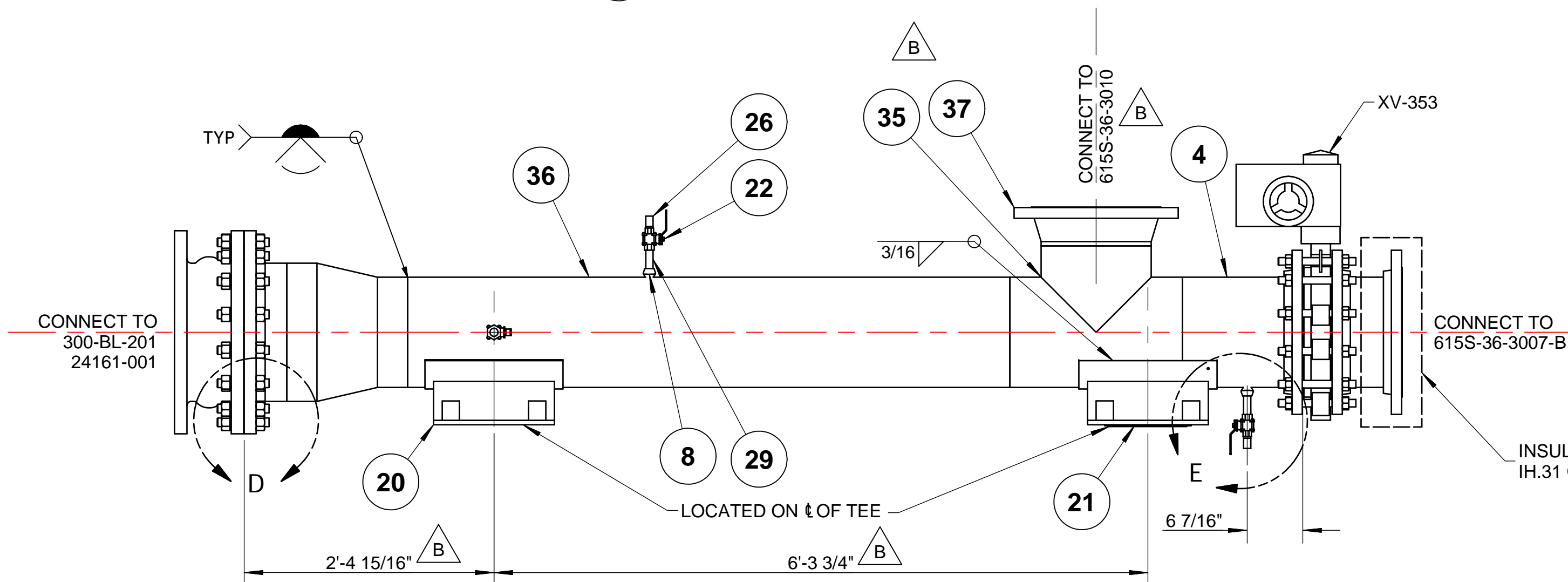
REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1307	KP	A.BARLOW	4/3/2018
B	REVISED PER ECO #1311	KGG	A.BARLOW	5/22/2018



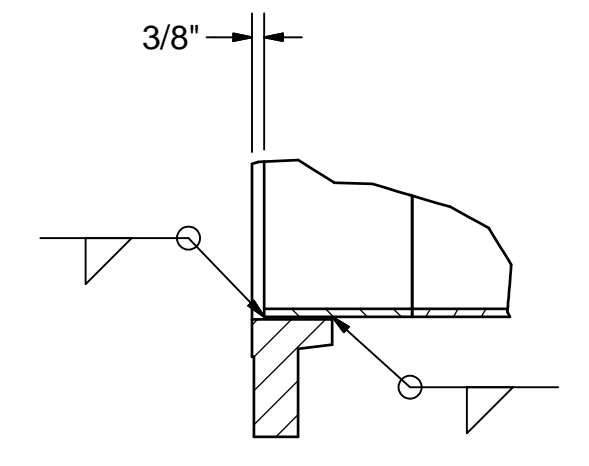
**TOP VIEW**  
SCALE 1"=1'-0"



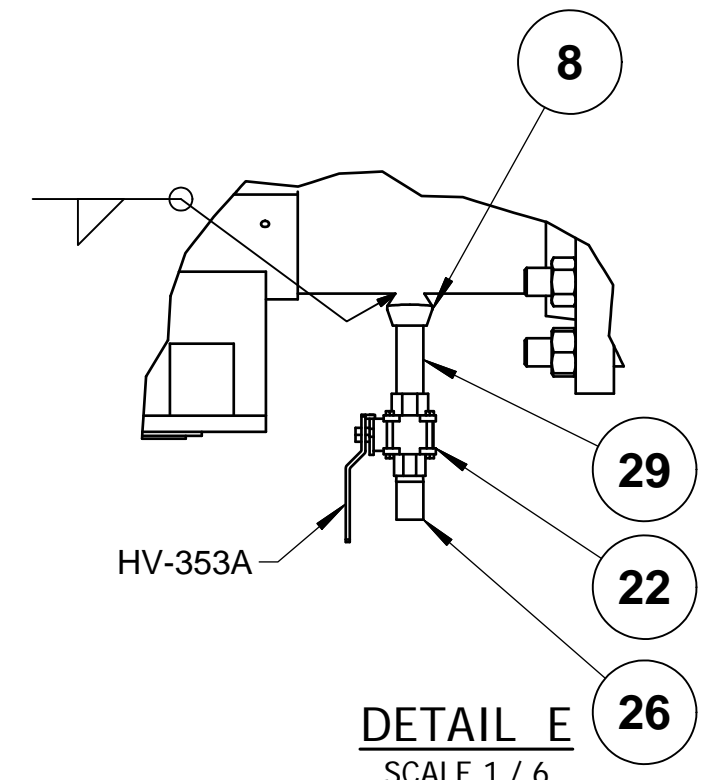
**ISOMETRIC VIEW**  
N.T.S.



**FRONT VIEW**  
SCALE 1"=1'-0"



**DETAIL D**  
TYP SO FLANGE WELDMENT  
SCALE 1 / 6  
ITEMS 13 & 16 NOT SHOWN



**DETAIL E**  
SCALE 1 / 6

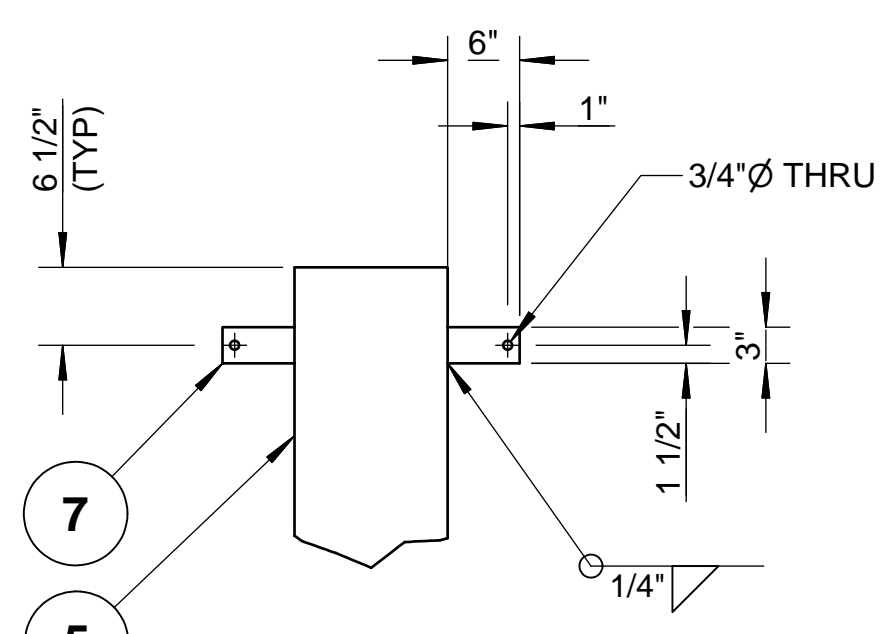
**PART NUMBER: 615S-36-3007-A**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-017	0.39 ft	PIPE, SCH10S, EFW 16"	ASTM A312 TP304/L
3	4520-015	0.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
4	4520-015	1.15 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
5	-DELETED-	-DELETED-	-DELETED-	
6	4567-017-015	1	REDUCER, CON, SCH10S 16" x 12"	ASTM A403WP304/L-W
8	4605-015-003	3	PIPET (SOCKOLET), 10S x CL 3M (3000#), 12" x 1/2"	ASTM A182F304/L
10	4638-015	3	FLANGE, SO, 150#, RF, 12"	ASTM A182F304/L
12	8766-015	2	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 12"	
13	8806-308	1	EXPANSION JOINT, 16" FLG X 8" LG	Rubber
14	23880-004	1	VALVE, 12" BUTTERFLY ASSY, SS, ISOLATION ELECTRIC ACTUATED	AISI 304
16	7567-161-096	16	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 1-8 UNC, 6" LNG	ASTM A193 GR. B7
19	9267-017	1	FLG, SO, 150# FF, 16"	ASTM A182F304/L
20	24923-100	1	PIPE SUPPORT, CUSTOM FABRICATED, SS400, PS-506	
21	24923-200	1	PIPE SUPPORT, CUSTOM FABRICATED, SS4000, PS-507	
22	21957-003	3	BALL 300# SWXSCR SS316-TRM MTL-ST FP HDL-OP	STAINLESS STEEL, ASME SA-182 F316
23	- DELETED -	- DELETED -	- DELETED -	
24	- DELETED -	- DELETED -	- DELETED -	
25	- DELETED -	- DELETED -	- DELETED -	
26	4608-003	2	PLUG, ROUND HEAD, SCR, 1/2"	ASTM A182F304/L
27	22526-001	41 sq ft	INSULATION, 2"	MINERAL WOOL
28	20582-001	54 sq ft	JACKET, .020" THK	ALUMINUM
29	4522-003	0.75 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
30	7568-003-001	1	BUSHING, HEX HEAD, SCR, 1/2" x 1/4"	ASTM A182F304/L
31	8897-001	1	NIPPLE, SCH80, SMLS, TBE, 1/4"	ASTM A312 TP304/L
32	24707-002	1	TRANSMITTER, PRESSURE, 1/4"FNPT, 4-20mA, 0-4 PSIG	AISI 304
33	7567-141-144	12	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 7/8-9 UNC, 9" LNG	ASTM A193 GR. B7
35	4560-015	1	TEE, EQUAL, SCH10, 12"	ASTM A403WP304/L-W
36	4520-015	5.81 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
37	4646-015	1	FLG, WN, 150# RF, SCH10S BORE, 12"	ASTM A182F304/L

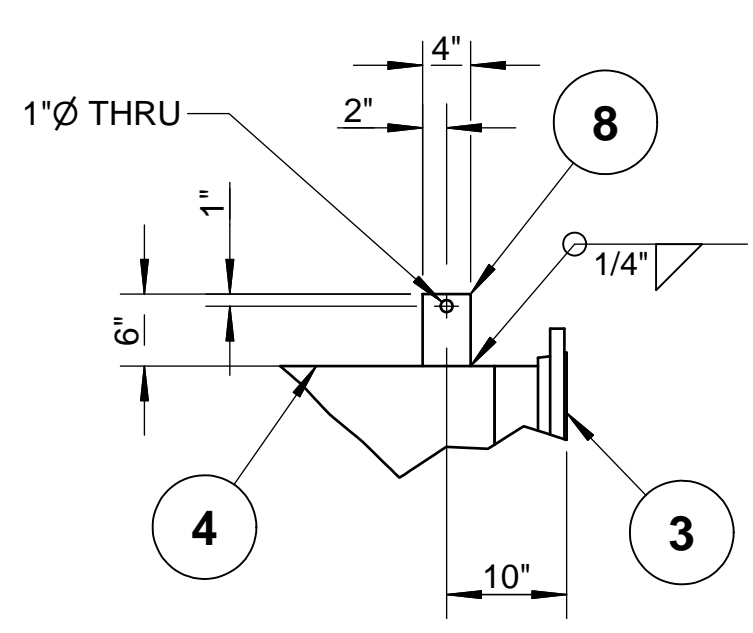
**NOTES:**

1. MATERIALS OF FABRICATION PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIALS.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATE PER SP-FCE-80-1.

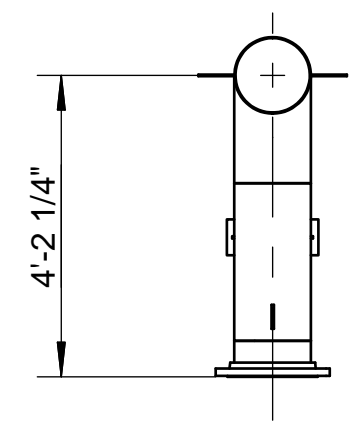
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	DRAWN: K.PERSICO 11/23/16 ENGINEER: P.DJORAJIA 11/23/16 APPROVED: A.BARLOW 11/23/16 RELEASED: A.HADJIS 11/23/16	TITLE: SureSource 4000 PIPING ASSEMBLY LINE NO.: AG-3007-AF-12"-ih		
	CAGE CODE: 63131 REVISION INDICATOR: D	LOCATION: 24064 DWG NO: 615S-36-3007		SCALE: AS SHOWN SHEET: 1 OF 3
	ALL DIMENSIONS ARE ±1/16" UNLESS OTHERWISE SPECIFIED			



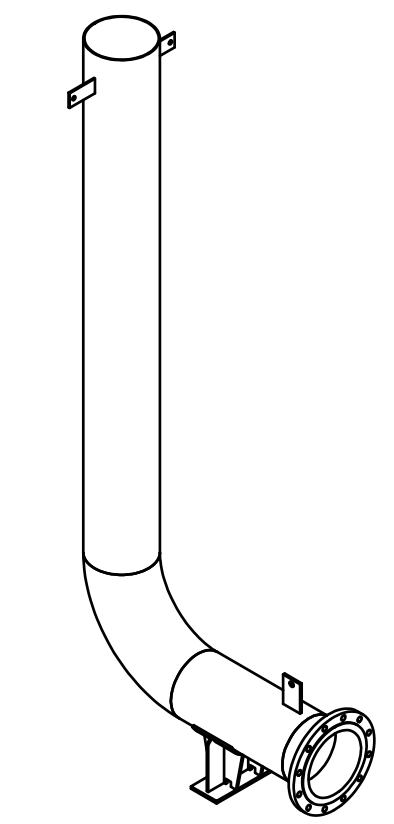
**DETAIL 1**  
SCALE 3/4" = 1'-0"



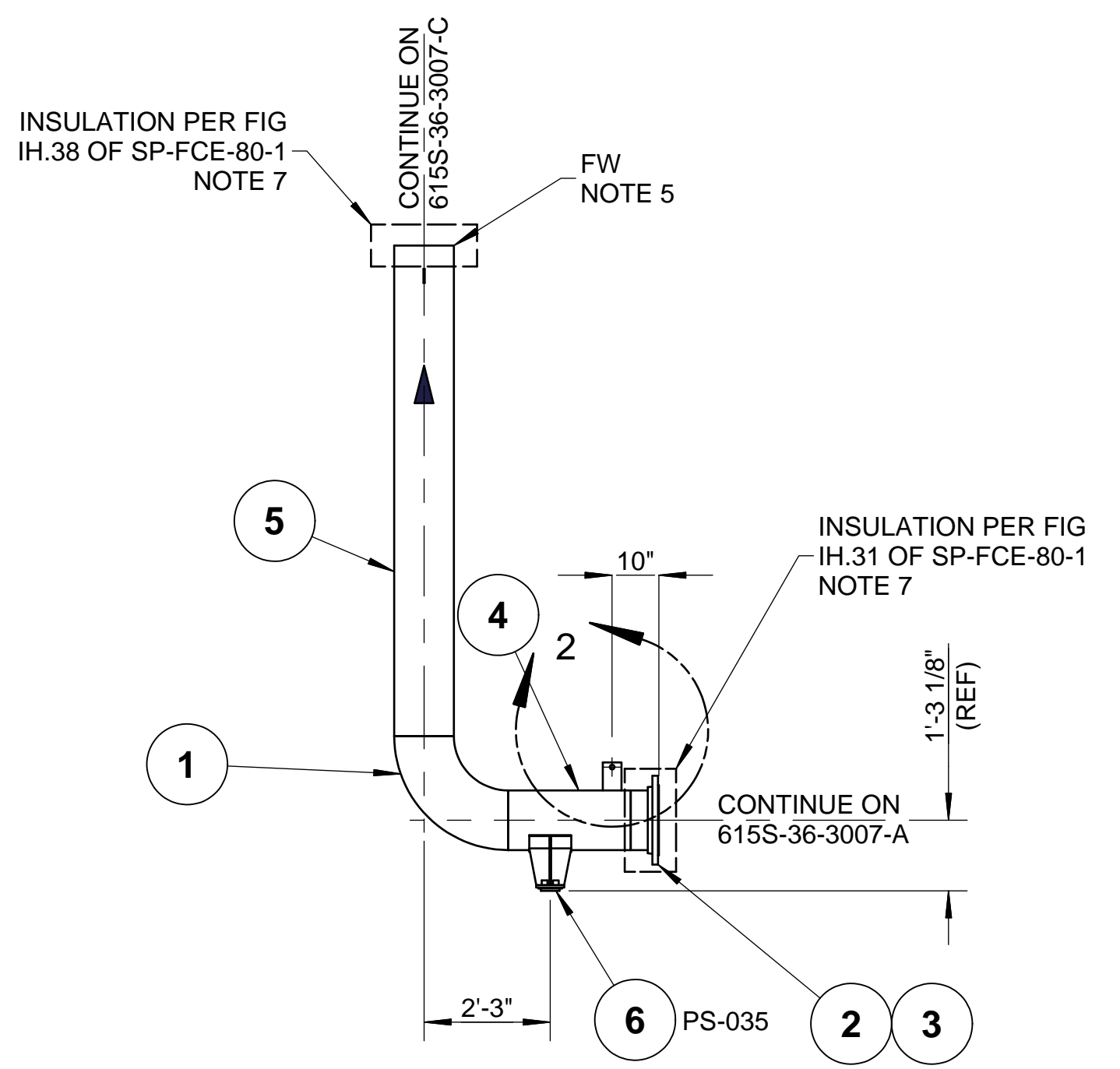
**DETAIL 2**  
SCALE 3/4" = 1'-0"



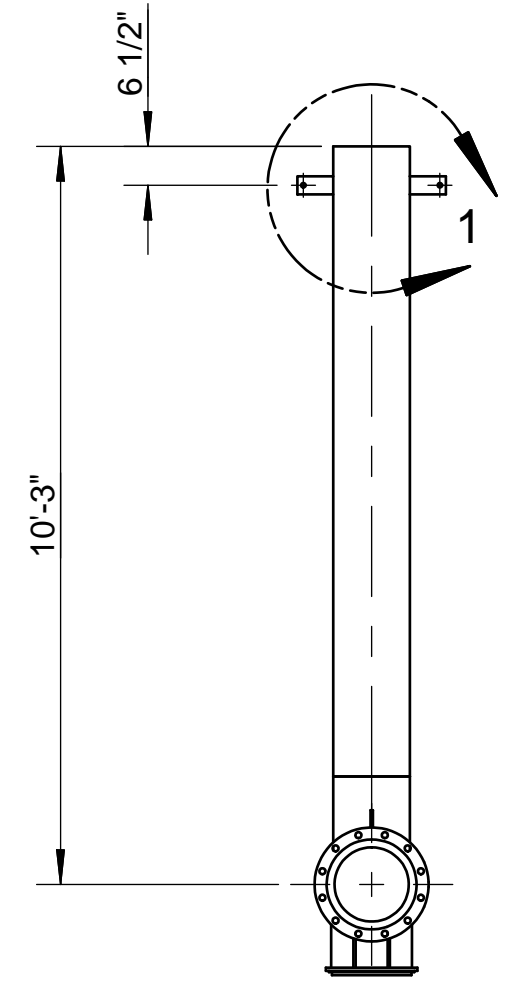
**TOP VIEW**  
SCALE 3/8" = 1'-0"



**ISOMETRIC VIEW**



**SIDE VIEW**  
SCALE 3/8" = 1'-0"



**FRONT VIEW**  
SCALE 3/8" = 1'-0"

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

**PART NUMBER: 615S-36-3007-B**

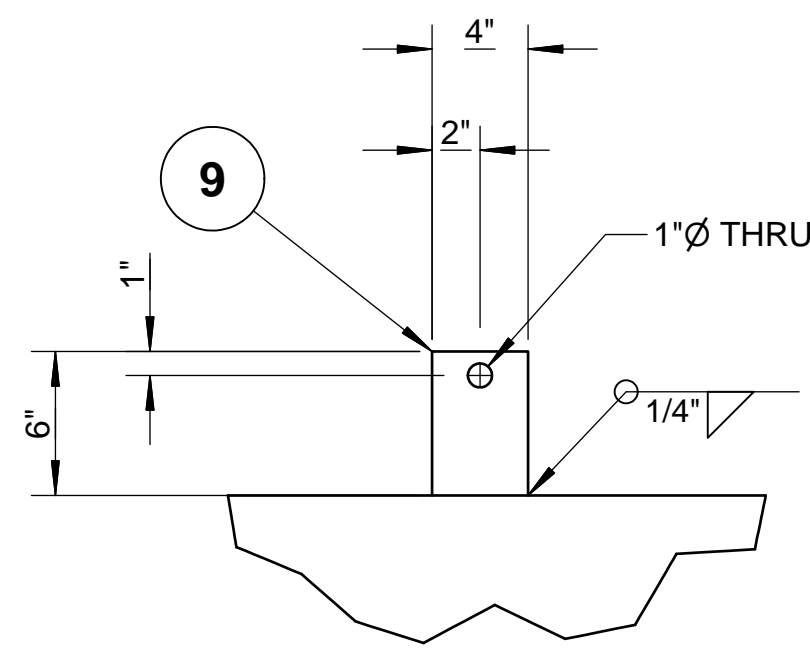
LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4543-015	1	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
2	8682-015	1	FLG, LJ, 150#, 12"	ASTM A182F304/L
3	4615-015	1	STUB END, SCH10S, 12"	ASTM A403WP304/L-W
4	4520-015	2.19 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
5	4520-015	8.75 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
6	25115-15-135-6-8	1	HEAVY DUTY SADDLE, 12", AISI 304, INSULATION BAND SLOT, GRAPHITE ON GRAPHITE, 6" LNG, 8" BOP	AISI 304
7	18100-003-050	2	PLATE, 1/4, 3x6	ASTM A240-304L
8	18100-005-050	1	PLATE, 3/8, 4x6	ASTM A240-304L
9	22526-001	46 sq ft	INSULATION, 2"	MINERAL WOOL
10	20582-001	61 sq ft	JACKET, .020" THK	ALUMINUM

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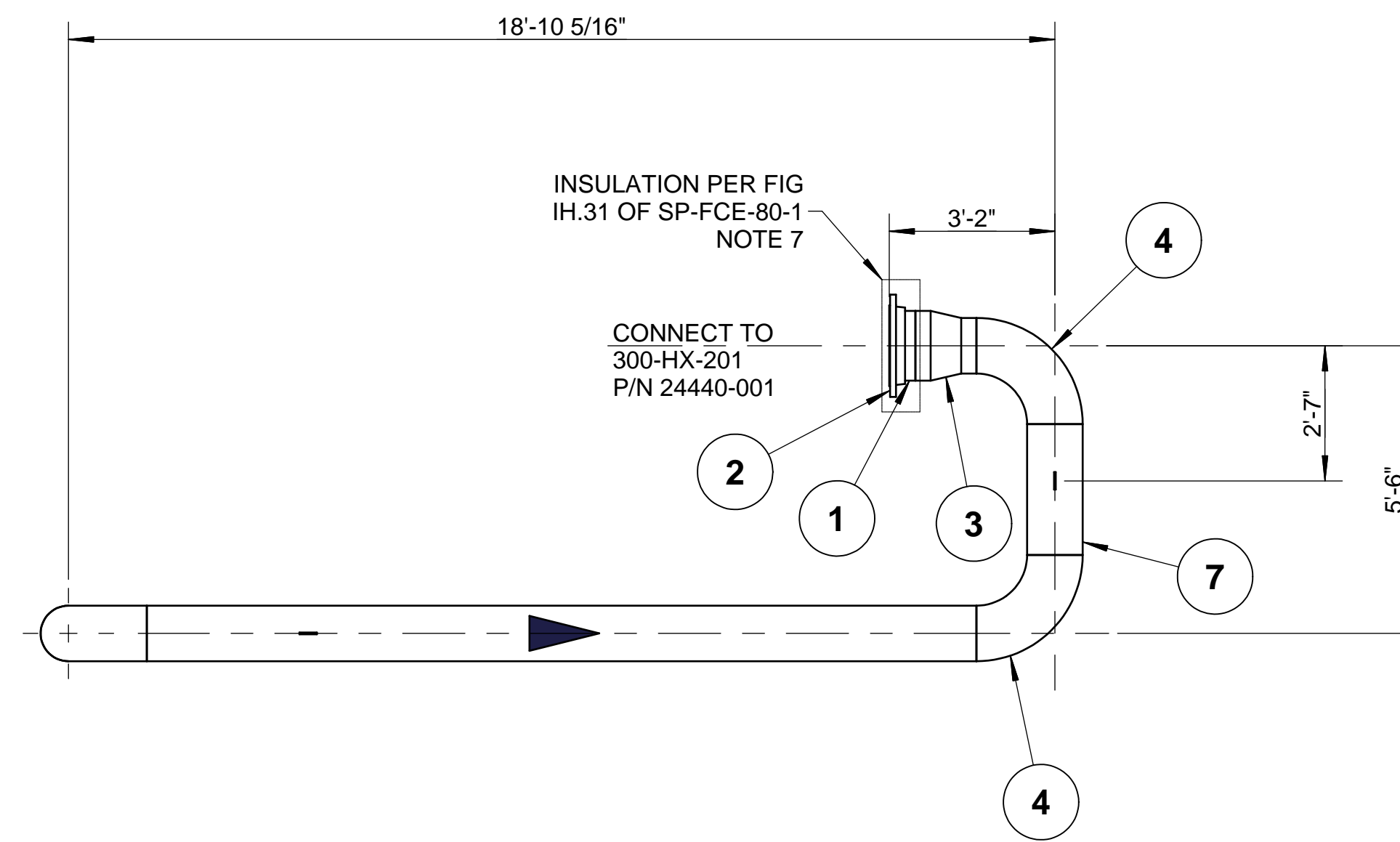
**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO.: AG-3007-AF-12"-ih**

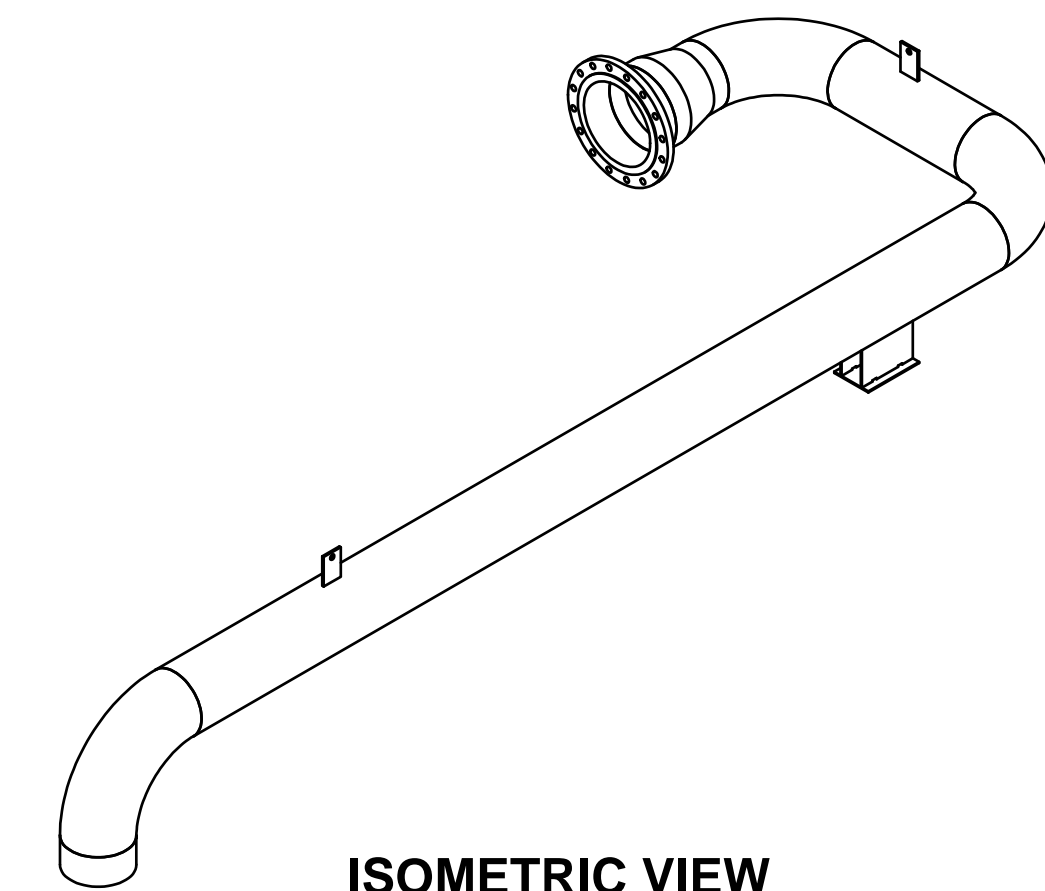
SIZE	LOCATION	DWG NO	
<b>D</b>	<b>24097</b>	<b>615S-36-3007</b>	<b>B</b>
SCALE	AS SHOWN	SHEET	2 OF 3



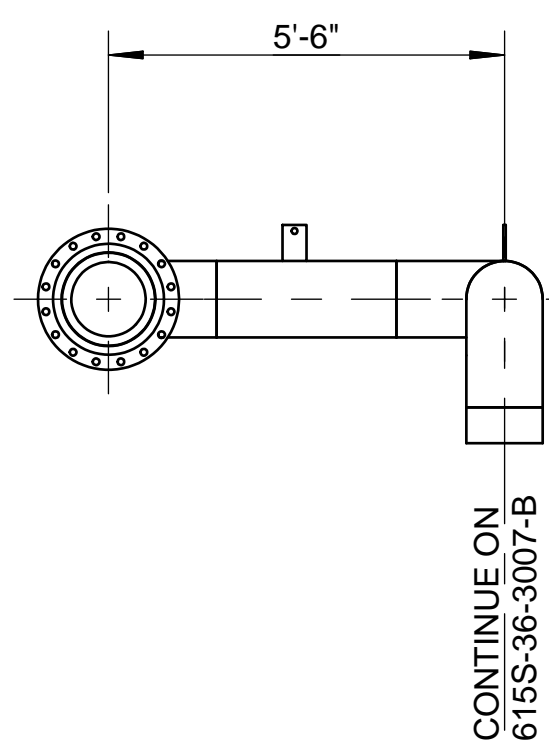
**DETAIL 1**  
SCALE 1 1/2" = 1'-0"  
(2 PLACES)



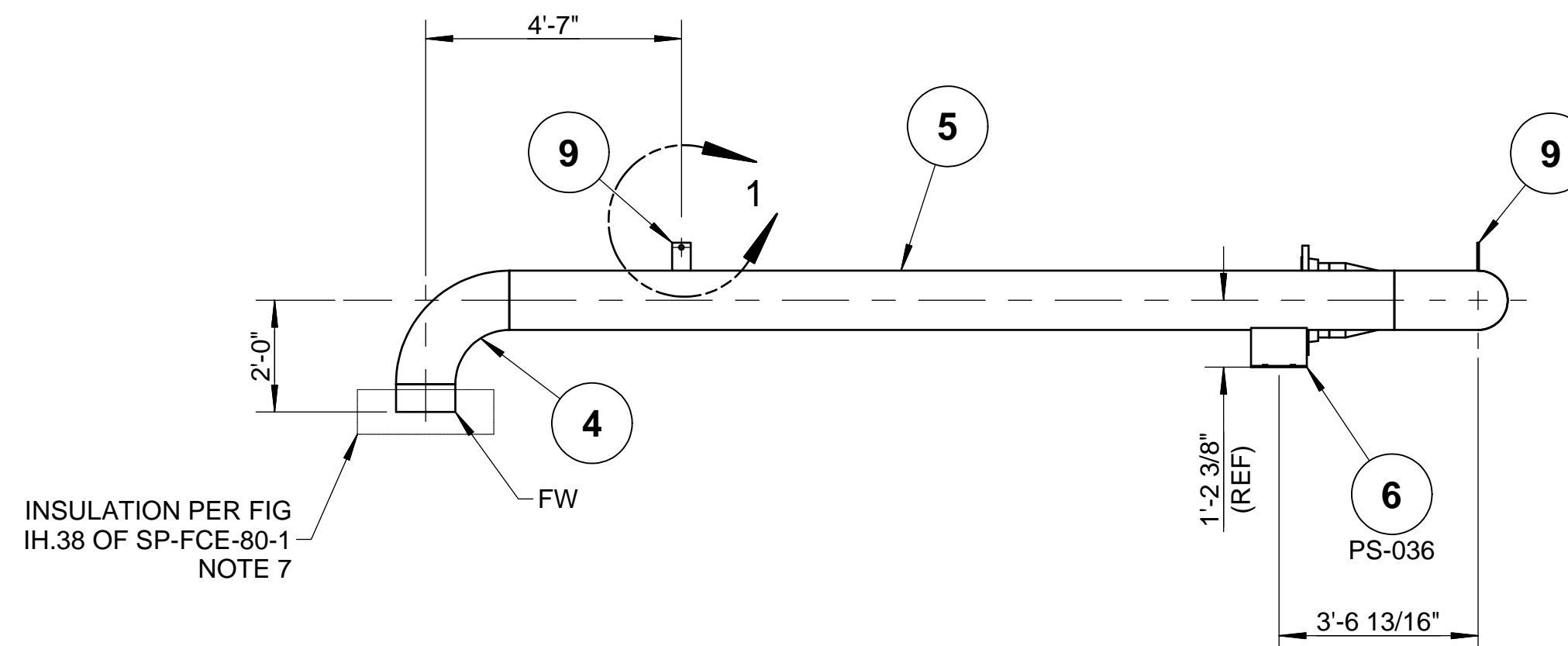
**TOP VIEW**  
SCALE 3/8" = 1'-0"



**ISOMETRIC VIEW**



**SIDE VIEW**  
SCALE 3/8" = 1'-0"



**FRONT VIEW**  
SCALE 3/8" = 1'-0"

**PART NUMBER: 615S-36-3007-C**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4615-017	1	STUB END, SCH10S, 16"	ASTM A403WP304/L-W
2	8682-017	1	FLG, LJ, 150#, 16"	ASTM A182F304/L
3	4567-017-015	1	REDUCER, CON, SCH10S 16" x 12"	ASTM A403WP304/L-W
4	4543-015	3	ELL 90 DEG LR SCH10S, 12"	ASTM A403WP304/L-W
5	4520-015	15.86 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
6	25012-15-130-12-8	1	DOUBLE UPRIGHT T-SHOE, 12, S3 - INSULATION BAND SLOTS	AISI 304
7	4520-015	2.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
8	4520-015	0.50 ft	PIPE, SCH10S, EFW 12"	ASTM A312 TP304/L
9	18100-005-050	2	PLATE, 3/8, 4x6	ASTM A240-304L
10	22526-001	95 sq ft	INSULATION, 2"	MINERAL WOOL
11	20582-001	125 sq ft	JACKET, .020" THK	ALUMINUM

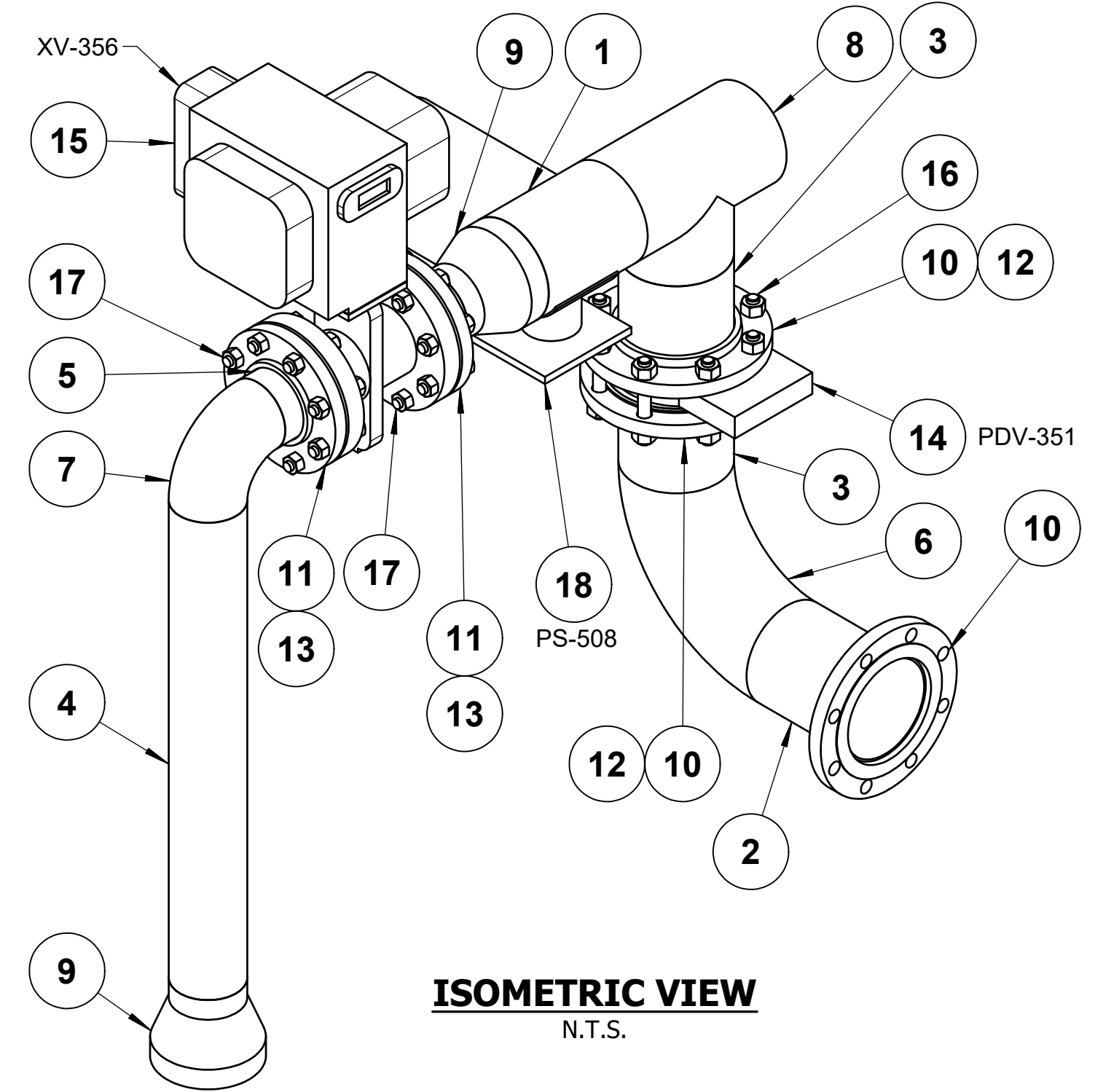
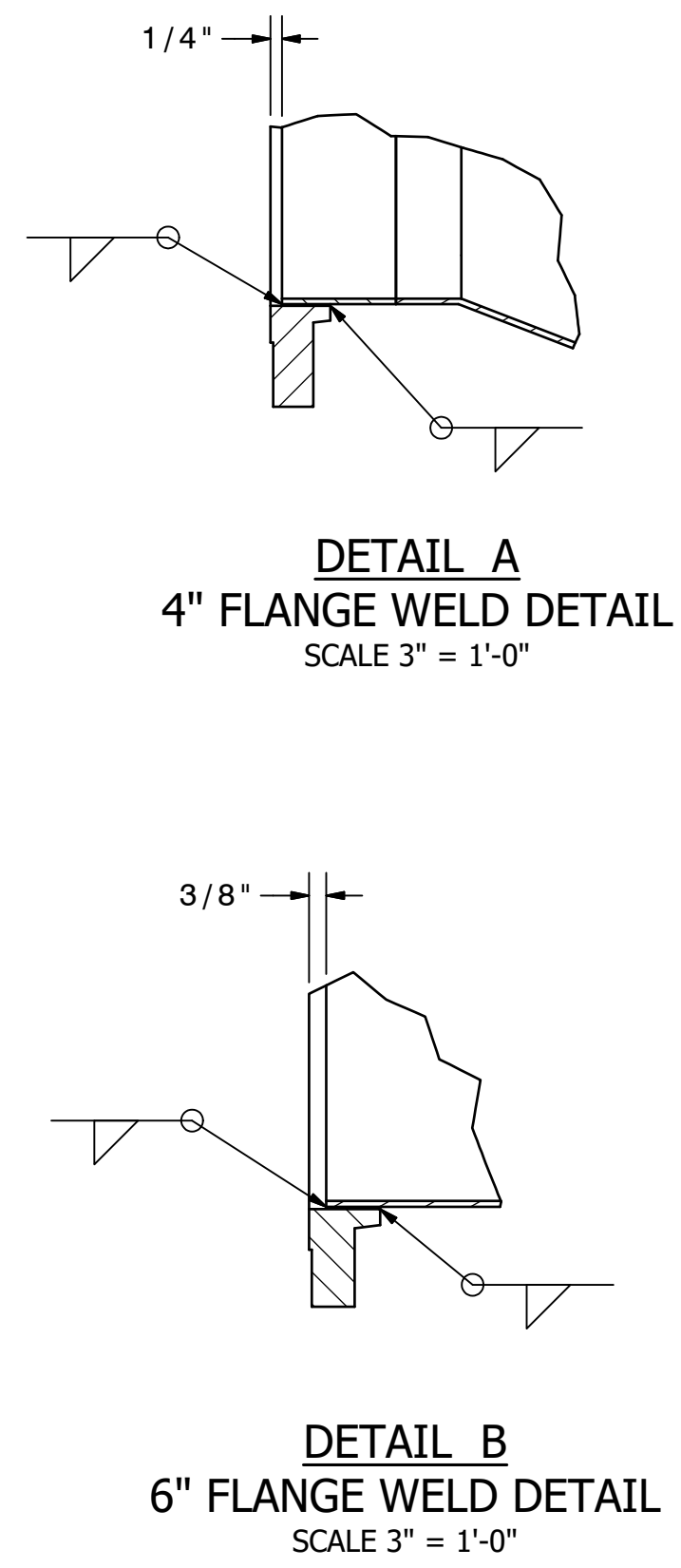
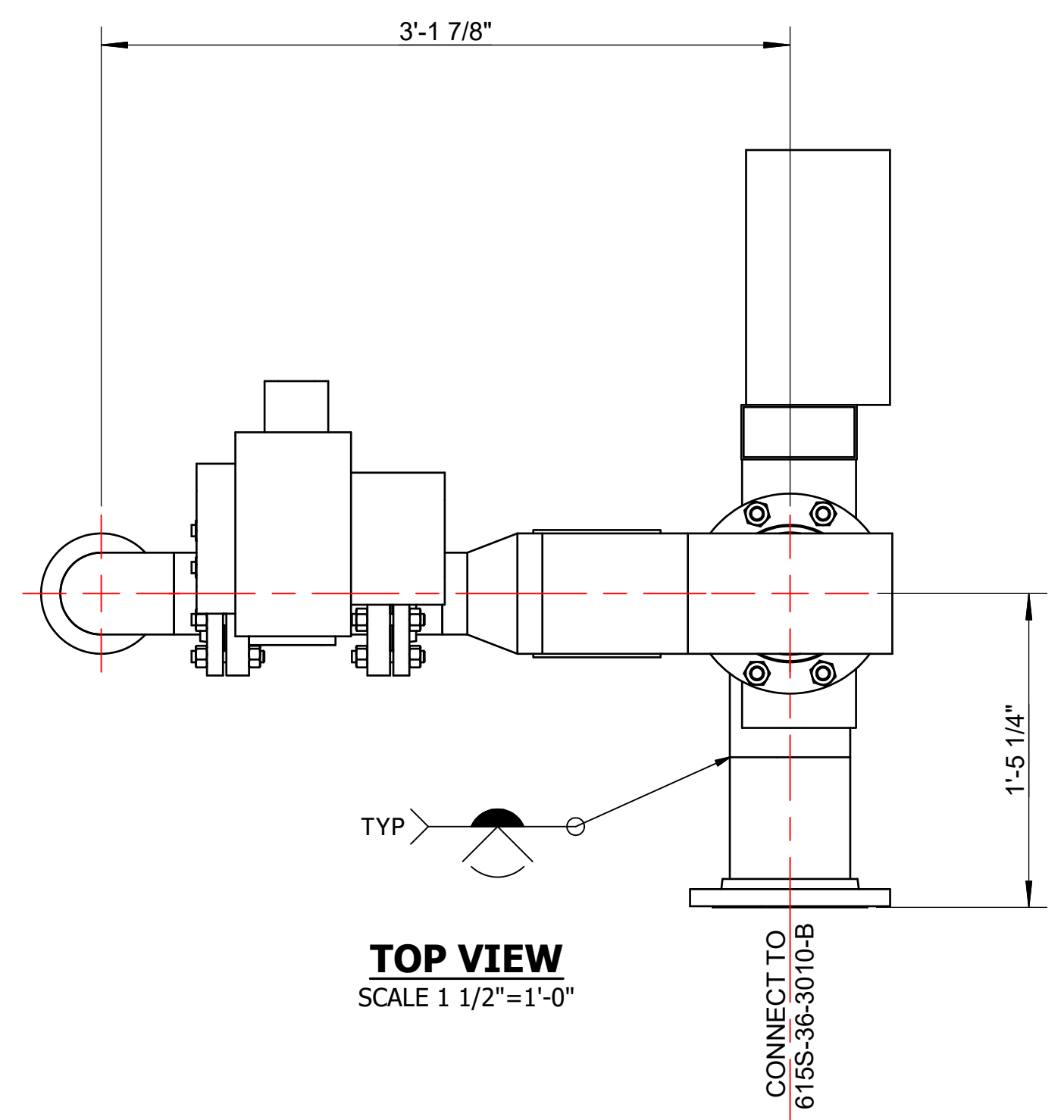
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**fuelcellenergy** 3 Great Pasture Rd., Danbury, CT 06813

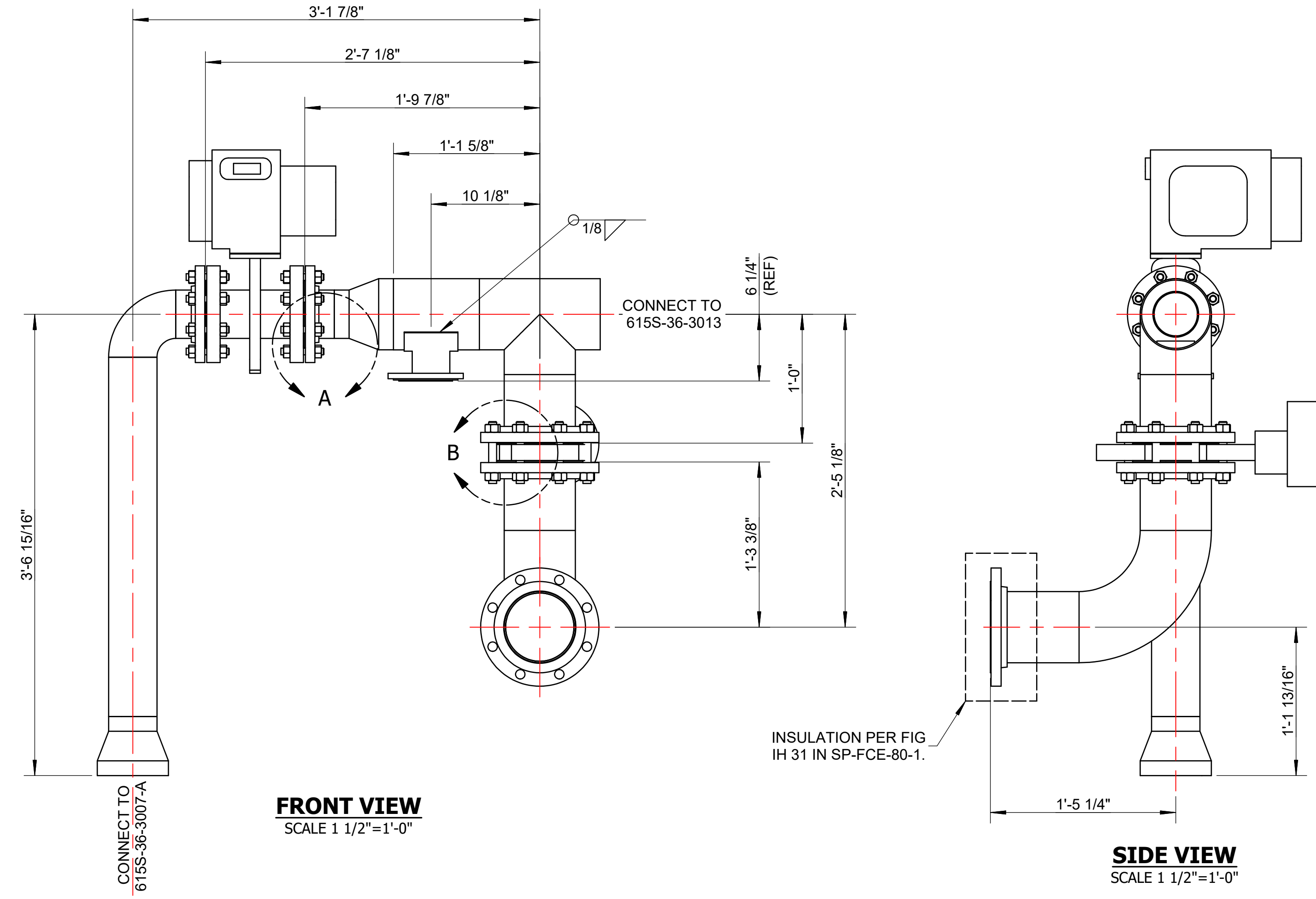
TITLE  
**SureSource 4000  
PIPING ASSEMBLY  
LINE NO. AG-3007-AF-12"-lh**

SIZE	LOCATION	DWG NO	
<b>D</b>	<b>24097</b>	<b>615S-36-3007</b>	<b>B</b>
SCALE	AS NOTED	SHEET	3 OF 3

REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
A	PRODUCTION RELEASE PER ECO# 1307	KP	A.BARLOW	4/3/2018



- NOTES:**
- MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
  - WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
  - PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
  - REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
  - FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.
  - INSULATION LAYERING PER LINE LIST 615S-01-02.
  - INSULATION PER SP-FCE-80-1.

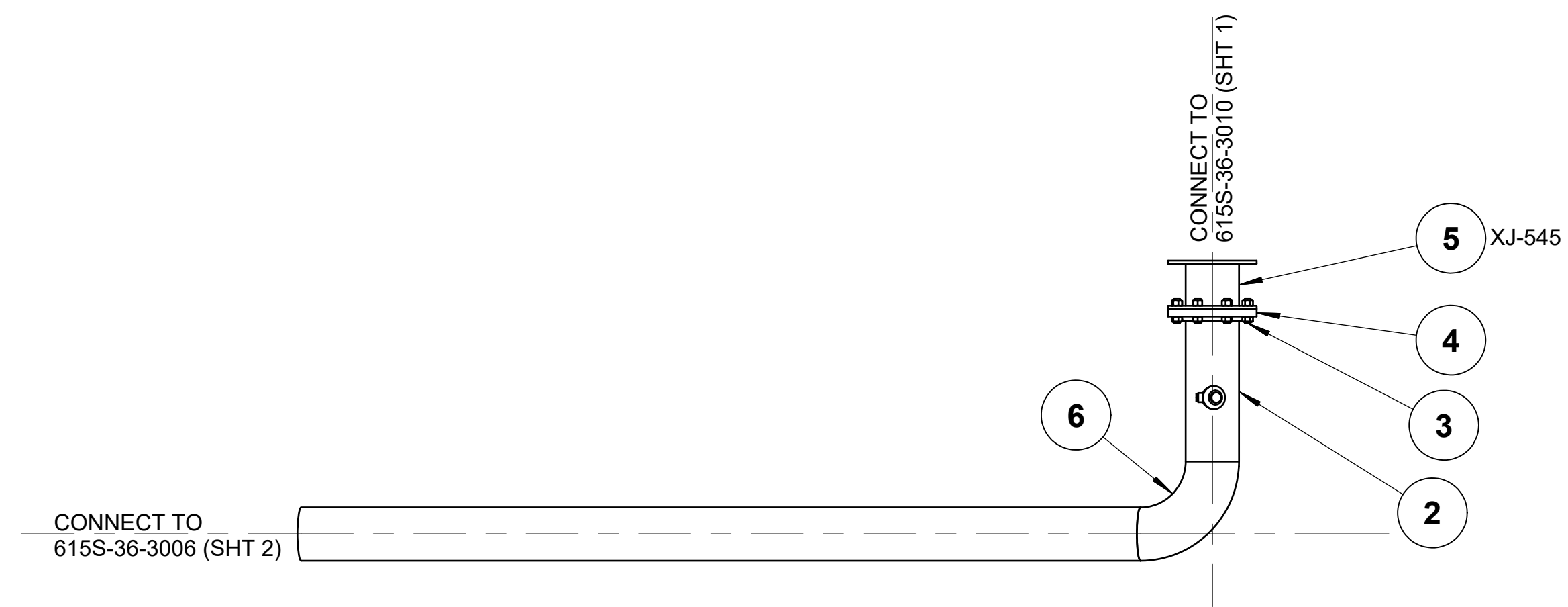


**PART NUMBER: 615S-36-3010-A**

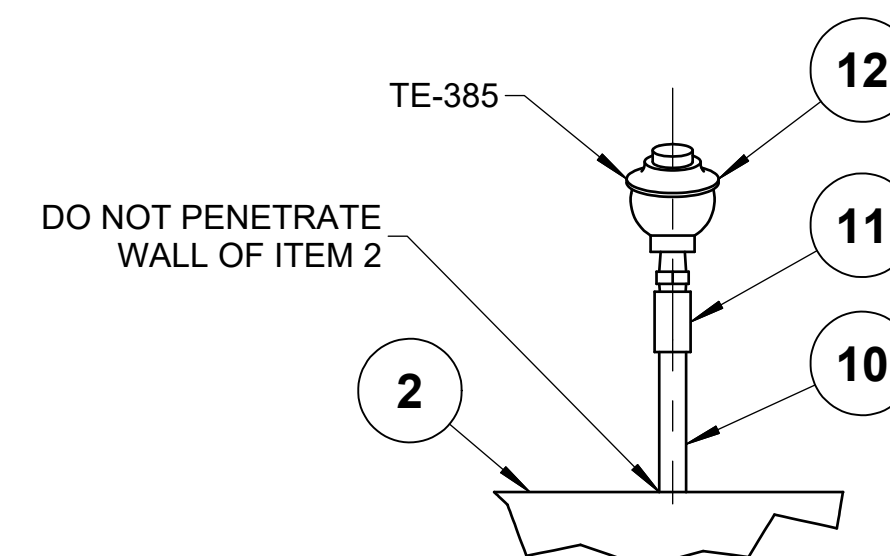
LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-012	0.67 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304/L
2	4520-012	0.66 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304/L
3	4520-012	1.00 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304H/L
4	4520-011	2.79 ft	PIPE, SCH10S, EFW 4"	ASTM A312 TP304/L
5	4520-011	0.42 ft	PIPE, SCH10S, EFW 4"	ASTM A312 TP304/L
6	4543-012	1	ELL 90 DEG LR SCH10S, 6"	ASTM A403WP304/L-W
7	4550-011	1	ELL 90 DEG SR SCH10S, 4"	ASTM A403WP304/L-W
8	4560-012	1	TEE, EQUAL, SCH10, 6"	ASTM A403WP304/L-W
9	4567-012-011	2	REDUCER, CON, SCH10S 6" x 4"	ASTM A403WP304/L-W
10	4638-012	3	FLANGE, SO, 150#, RF, 6"	ASTM A182F304/L
11	4638-011	2	FLANGE, SO, 150#, RF, 4"	ASTM A182F304/L
12	8766-012	2	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 6"	
13	8766-011	2	GASKET, 150# ARAMID FIBER W/NITRILE BINDER 1/8" THK, 4"	
14	20640-016	1	VALVE, BUTTERFLY, 6" COLD ASSY, ACT ORIENTATION 1	AISI 304
15	24315-002	1	VAVLE, GATE, 3" SHUTOFF, FF, L TOP	Iron, Cast
16	7567-121-092	8	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 3/4-10 UNC, 5.75" LNG	STEEL, ASME SA-193 GRADE B7-TC
17	7567-101-064	16	BOLT-STUD W/ A194-2H HV-HX NUTS, TEFLON COATED, 5/8-11 UNC, 4" LNG	ASTM A193 GR. B7
18	24923-300	1	PIPE SUPPORT, CUSTOM FABRICATED, SS4000, PS-508	
19	22526-001	16 sq ft	INSULATION, 2"	MINERAL WOOL
20	20582-001	28 sq ft	JACKET, .020" THK	ALUMINUM

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	DRAWN: K.GROSS 05/03/17 ENGINEER: P.DHORAJIA 05/03/17 APPROVED: A.BARLOW 05/03/17 RELEASED: P.BEAUDOIN 05/03/17	TITLE: SureSource 4000 PIPING ASSEMBLY LINE NO.: AG-3010-AF-6"-ih		
	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE ±1/16"	SIZE: D 24064 LOCATION: AS NOTED		DWG NO: 615S-36-3010 SHEET: 1 OF 2
	CAGE CODE: 63131 REVISION INDICATOR: FLAG NOTE			

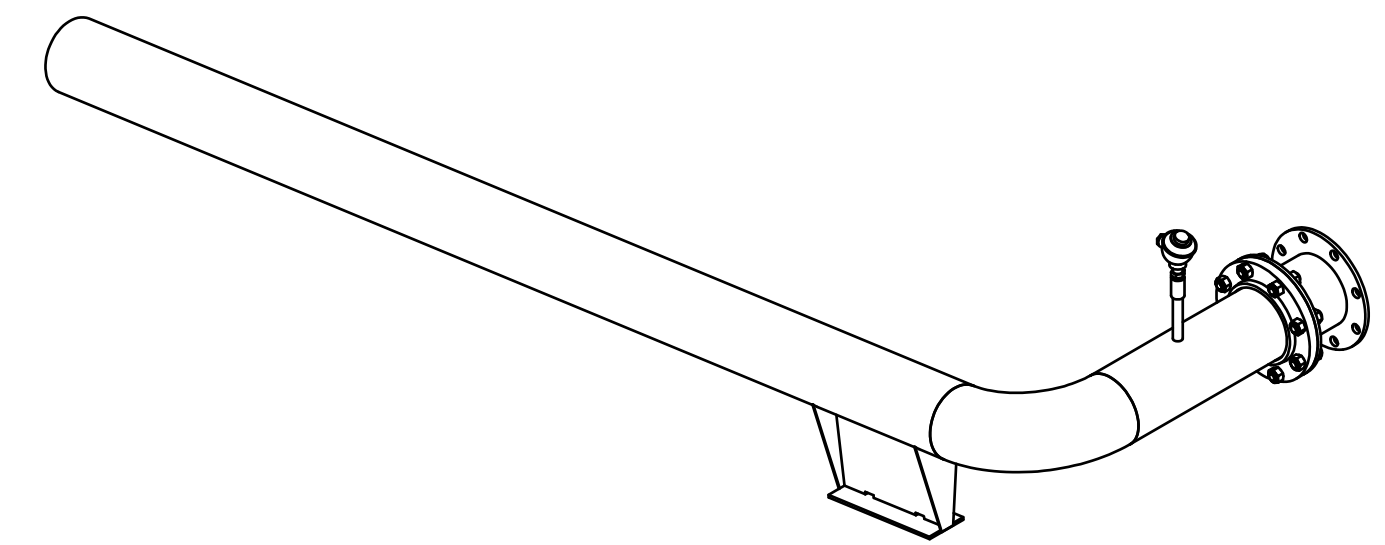




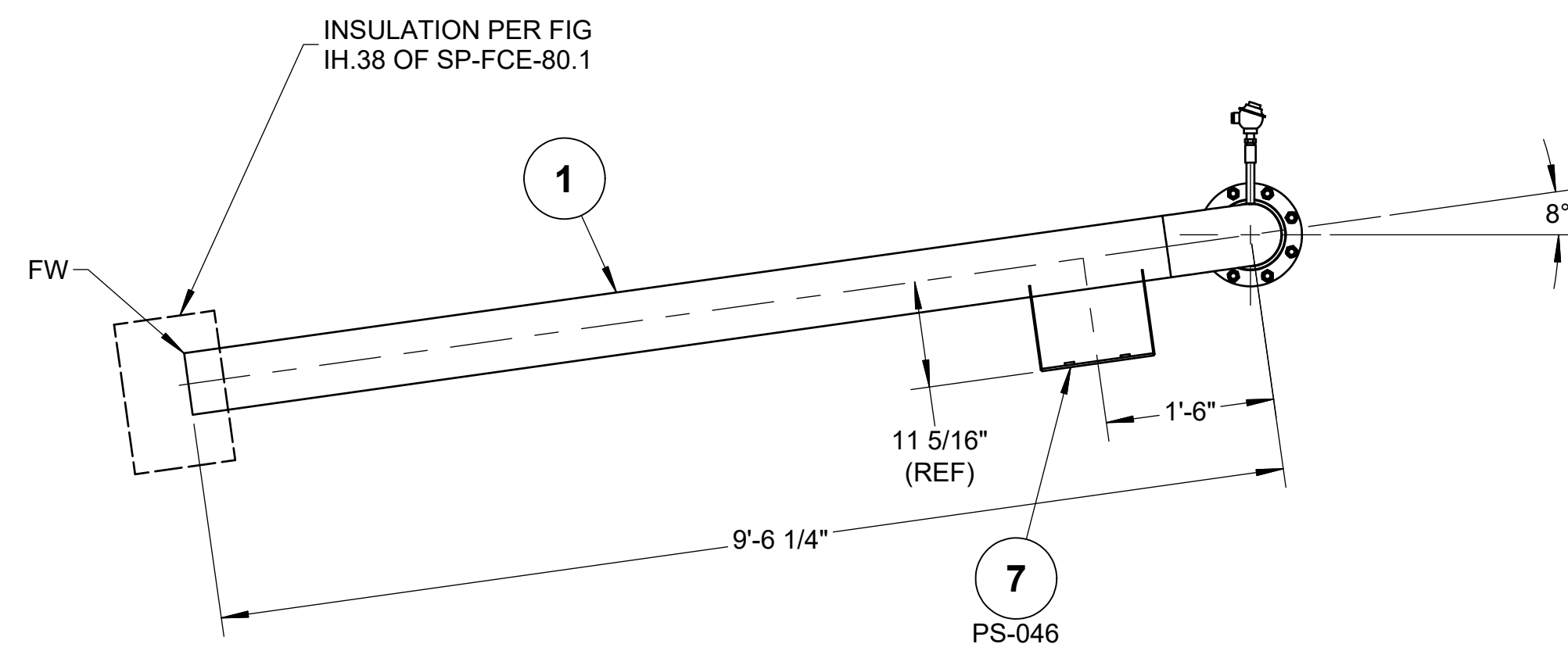
**TOP VIEW**  
SCALE 3/4"=1'-0"



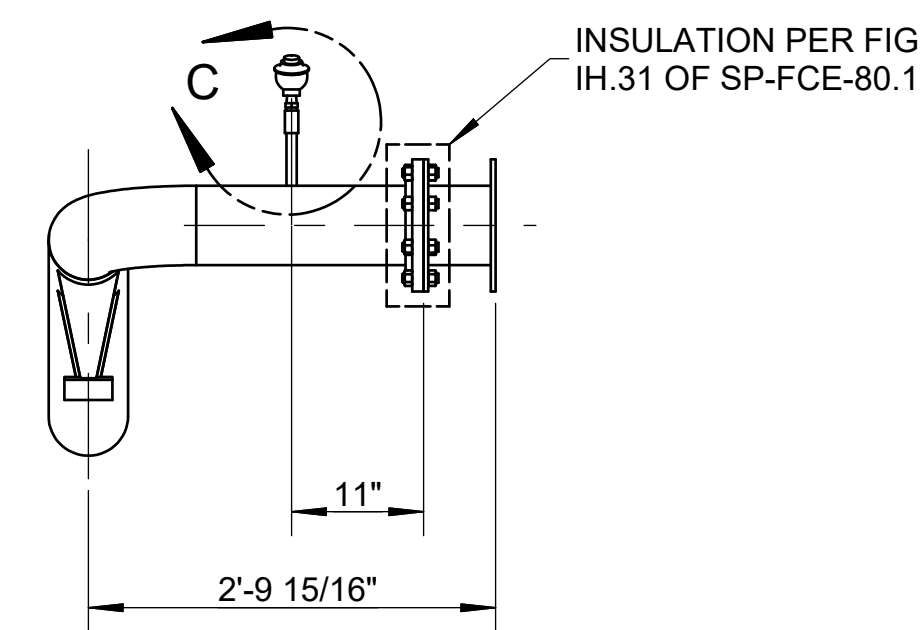
**DETAIL C**  
SCALE 2"=1'-0"



**ISOMETRIC VIEW**  
N.T.S.



**FRONT VIEW**  
SCALE 3/4"=1'-0"



**SIDE VIEW**  
SCALE 3/4"=1'-0"

**NOTES:**

1. MATERIALS OF FABRICATION AND PIPING DESIGN REQUIREMENTS PER SP-FCE-50-3.
2. WELDING, THERMAL TREATMENT, EXAMINATION AND TESTING, PER SP-FCE-90-2.
3. PURCHASE MATERIALS PER SP-FCE-50-11 AND SP-FCE-50-12.
4. REFER TO DOCUMENT 615S-01-01 FOR A LISTING OF ALL PROJECT DOCUMENTS.
5. FABRICATOR TO ADD ADDITIONAL 4" OF PIPE FOR FIELD FIT WELD. ADDITIONAL LENGTH DOES NOT APPEAR IN BILL OF MATERIAL.
6. INSULATION LAYERING PER LINE LIST 615S-01-02.
7. INSULATION PER SP-FCE-80-1.

**PART NUMBER: 615S-36-3010-B**

LIST OF MATERIALS				
ITEM	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	4520-012	8.77 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304/L
2	4520-012	1.57 ft	PIPE, SCH10S, EFW 6"	ASTM A312 TP304/L
3	4751-121-048	8	BOLT-STUD W/ A194-8M HV-HX NUTS, 3/4-10 UNC, 3 " LNG	ASTM A193B8M
4	21150-012	1	FLG, SO, 150# FF, 6"	ASTM A182F304/L
5	8806-309	1	EXPANSION JT, 6"-150#ROUND/NITRILE/NEOPRENE	NEOPRENE
6	4543-012	1	ELL 90 DEG LR SCH10S, 6"	ASTM A403WP304/L-W
7	25007-12-130-12-8	1	FAB T-SHOE W/GUSSET, 6, S3 - INSULATION BAND SLOTS	AISI 304
8	22526-001	22 sq ft	INSULATION, 2"	MINERAL WOOL
9	20582-001	35 sq ft	JACKET, .020" THK	ALUMINUM
10	4522-003	0.40 ft	PIPE, SCH40S, EFW, 1/2"	ASTM A312 TP304/L
11	8876-003	1	COUPLING, 3000#, SCR, 1/2"	ASTM A182F304/L
12	8727-032	1	THERMOCOUPLE, TYPE K, SL, UNGRND, 1/4". 6"	AISI 304
13	24448-220	1	KIT, HEAT TRACE, HT-3010-2	

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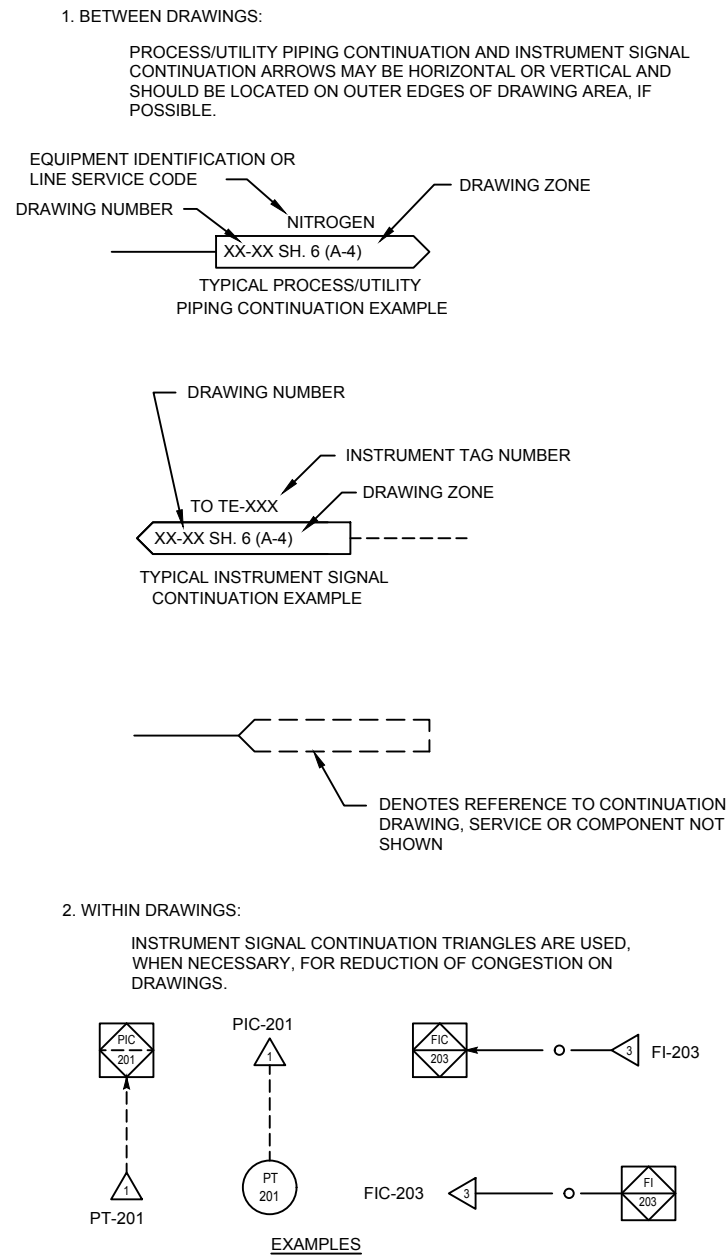
TITLE  
**SureSource 4000 PIPING ASSEMBLY**  
LINE NO.: AG-3010-AF-6"-ih

SIZE	LOCATION	DWG NO	
<b>D</b>	<b>24097</b>	<b>615S-36-3010</b>	<b>A</b>
SCALE	AS NOTED	SHEET	2 OF 2

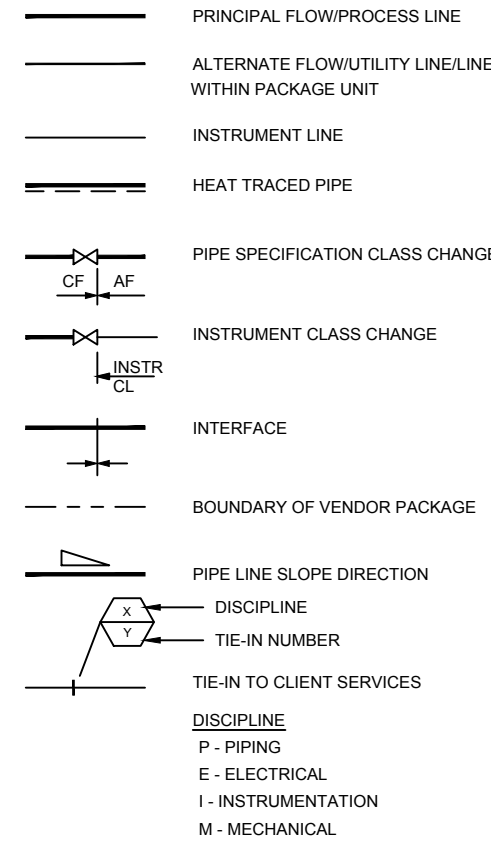
**ABBREVIATIONS**

ACG	ANODE COVER GAS
ADG	ANAEROBIC DIGESTER GAS
AMB	AMBIENT
ATM	ATMOSPHERE
BTU	BRITISH THERMAL UNIT
CS	CARBON STEEL
CSO	CAR SEAL OPEN
CSC	CAR SEAL CLOSED
CSP	CAR SEAL IN POSITION
DC	DIRECT CURRENT
DE	DEENERGIZED (SOLENOID VALVE POSITION)
DFC	DIRECT FUELCELL
DMP	DAMPER
E	ENERGIZED (SOLENOID VALVE POSITION)
EDI	ELECTRO DEIONIZATION
ET	ELECTRIC TRACED
°F	DEGREES FAHRENHEIT
FC	FAIL CLOSE
FL	FAIL LAST
FI	FAIL INDETERMINATE
FO	FAIL OPEN
FRP	FIBER REINFORCED PLASTIC
FV	FULL VACUUM
GPM	GALLONS PER MINUTE
H	HIGH ALARM
HH	HIGH HIGH ALARM
HLL	HIGH HIGH LIQUID LEVEL
HLL	HIGH LIQUID LEVEL
HP	HORSEPOWER
HR	HOUR
HSB	HOT STAND BY
ID	INSIDE DIAMETER
ib	INSULATION BLANKET
ih	INSULATION HOT (HEAT CONSERVATION)
IN	INCHES
IR	INFRARED RADIATION
is	INSULATION SAFETY
LBS	POUNDS
LC	LOCKED CLOSED
LEL	LOWER EXPLOSION LIMIT
LHV	LOWER HEATING VALUE
L	LOW ALARM
LL	LOW LOW ALARM
LLL	LOW LIQUID LEVEL
LO	LOCK OPEN
LP	LOW POINT
LVR	LOUVER
MH	MANHOLE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MW	MEGAWATT
NC	NORMALLY CLOSED
NLL	NORMAL LIQUID LEVEL
NNF	NORMALLY NO FLOW
NO	NORMALLY OPEN
OD	OUTSIDE DIAMETER
PFD	PROCESS FLOW DIAGRAM
P&ID	PIPING AND INSTRUMENTATION DIAGRAM
PLC	PROGRAMMABLE LOGIC CONTROLLER
PSG	PEAK SHAVE GAS
PSIG	POUNDS PER SQUARE INCH GAUGE
PV	PROCESS VARIABLE
RTD	RESISTANCE TEMPERATURE DETECTOR
RU	REFORMER UNIT
SC	SAMPLE CONNECTION
S/C	STEAM TO CARBON
SCFM	STANDARD CUBIC FEET PER MINUTE
SD	SHUTDOWN
SG	SIGHT GLASS
SH	SUPERHEATED
SP	SET POINT
SP.GR.	SPECIFIC GRAVITY
SS	STAINLESS STEEL
STM	STEAM
TBD	TO BE DETERMINED
TSO	TIGHT SHUT OFF
TW	THERMOWELL
TYP	TYPICAL
UPS	UNINTERRUPTIBLE POWER SUPPLY
UV	ULTRA VIOLET
VSD	VARIABLE SPEED DRIVE
WC	WATER COLUMN
ΔP	PRESSURE DIFFERENTIAL

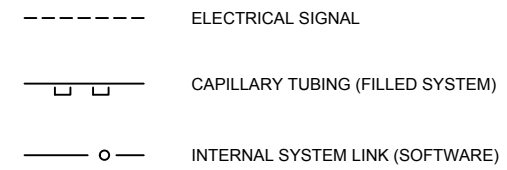
**CONTINUATION OF PIPING AND INSTRUMENT SIGNAL LINES**



**LINE WEIGHT AND SYMBOL IDENTIFICATION**



**INSTRUMENT SIGNAL IDENTIFICATION**



REVISION HISTORY				
REV	DESCRIPTION	BY	APPROVED	DATE
1	ISSUED FOR INTERNAL REVIEW	MHB	M. CROWLEY	09/15/15
2	REVISED PER INTERNAL REVIEW	MHB	M. CROWLEY	11/13/15
3	REVISED PRE-HAZOP	MHB	M. CROWLEY	03/03/16
4	REVISED POST-HAZOP	MHB	M. CROWLEY	05/02/16
5	REVISED PER INTERNAL REVIEW	MHB	M. CROWLEY	07/20/16
6	REVISED PER INTERNAL REVIEW	MHB	M. CROWLEY	09/16/16
7	REVISED PER INTERNAL REVIEW	MHB	M. CROWLEY	12/08/16
8	REVISED PER INTERNAL REVIEW	MHB	M. CROWLEY	02/24/17

**P&ID LEGEND OF SYMBOLOGY**

ABBREVIATIONS, COMPONENT IDENTIFICATION  
DWG. NO.: 615S-31-02 SH. 1

EQUIPMENT AND PIPING SYMBOLS  
DWG. NO.: 615S-31-02 SH. 2

VALVE AND INSTRUMENT SYMBOLS  
DWG. NO.: 615S-31-02 SH. 3

**PIPING AND INSTRUMENTATION DIAGRAMS**

WATER TREATMENT SYSTEM  
DWG. NO.: 615S-31-02 SH. 4

FUEL GAS DESULFURIZATION  
DWG. NO.: 615S-31-02 SH. 5

FUEL GAS PREPARATION (FUEL HEATING)  
DWG. NO.: 615S-31-02 SH. 6

FUEL GAS PREPARATION (PRE-REFORMER)  
DWG. NO.: 615S-31-02 SH. 7

DFC TOPPING MODULE PIPING & CONTROLS  
DWG. NO.: 615S-31-02 SH. 8

ANODE WATER RECOVERY  
DWG. NO.: 615S-31-02 SH. 9

FRESH AIR BLOWER AND PREHEATERS  
DWG. NO.: 615S-31-02 SH. 10

FIRED AIR HEATER  
DWG. NO.: 615S-31-02 SH. 11

DFC BOTTOMING MODULE PIPING & CONTROLS  
DWG. NO.: 615S-31-02 SH. 12

LIQUID NITROGEN MICROBULK  
DWG. NO.: 615S-31-02 SH. 13

ANODE GAS COOLING LOOP  
DWG. NO.: 615S-31-02 SH. 14

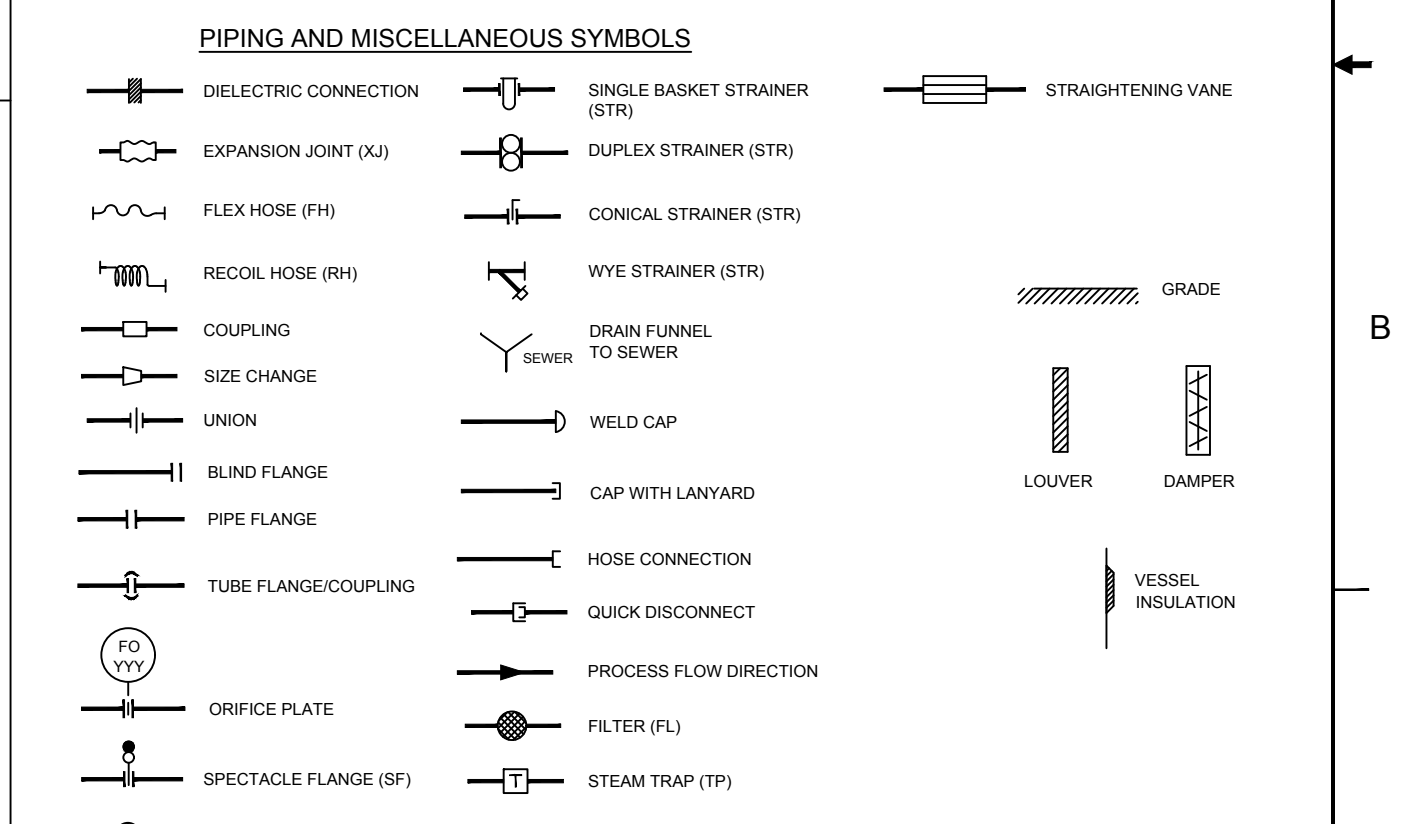
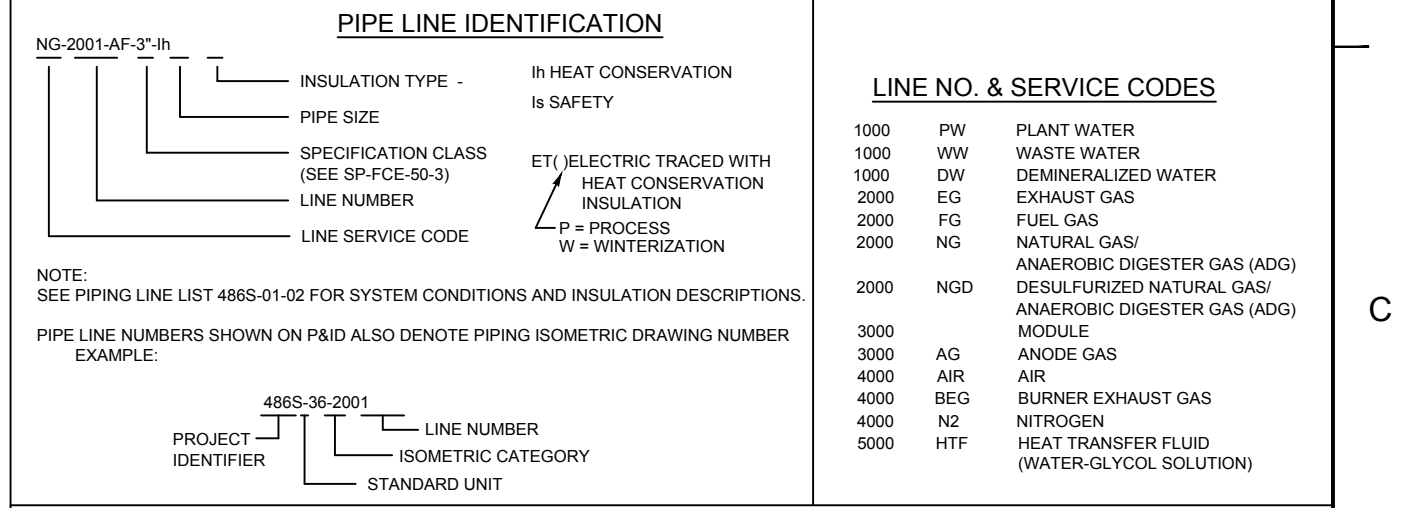
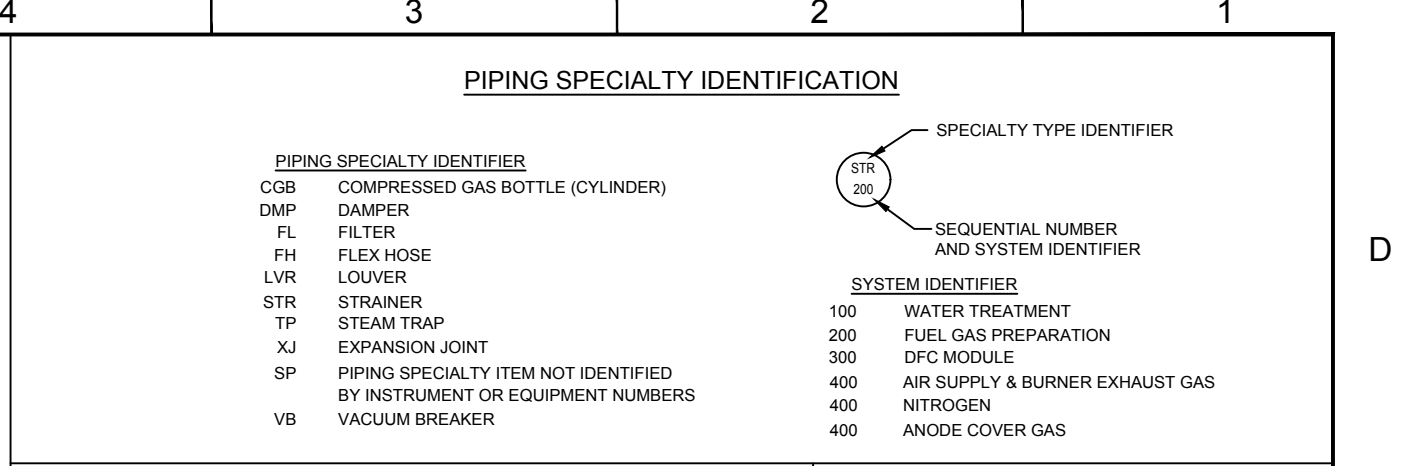
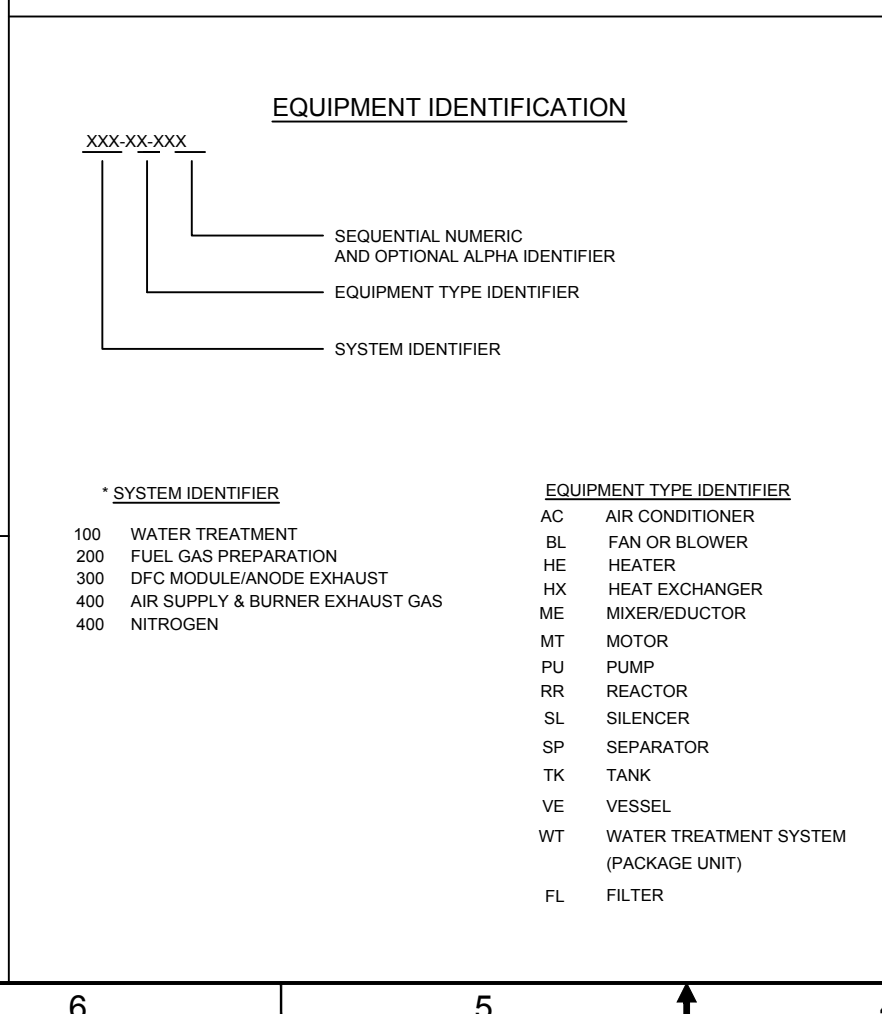
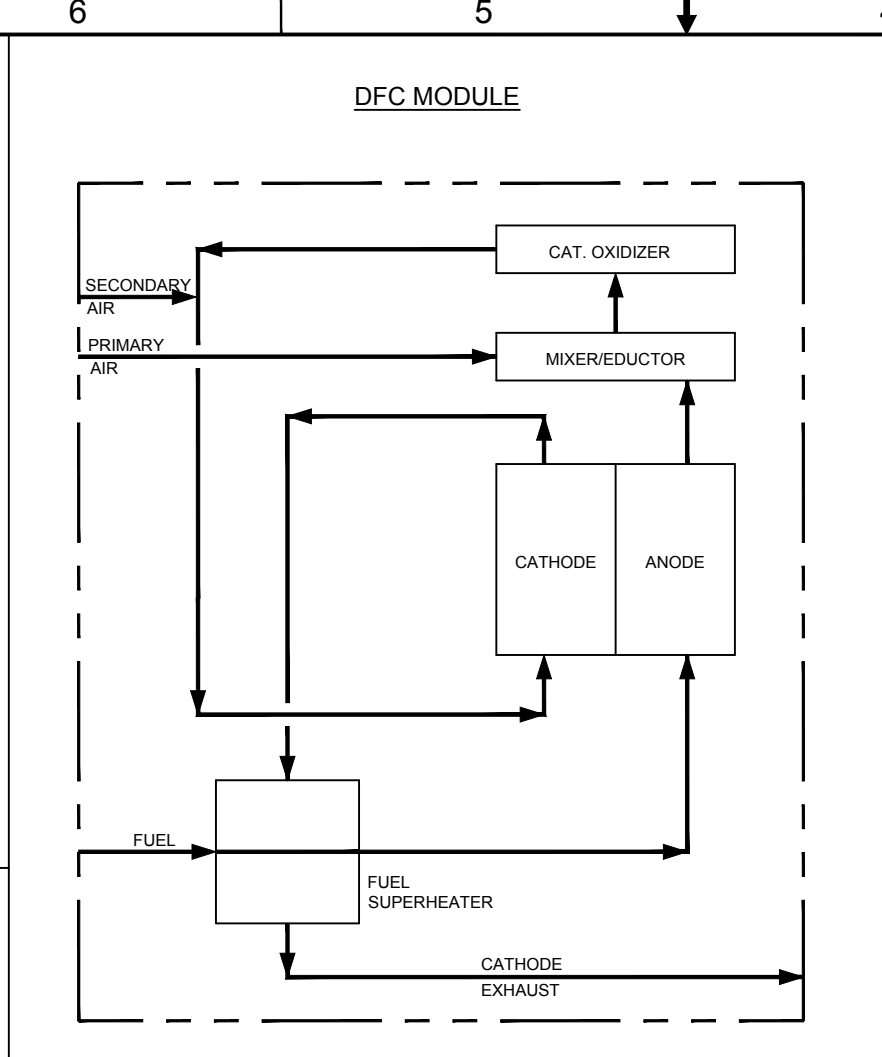
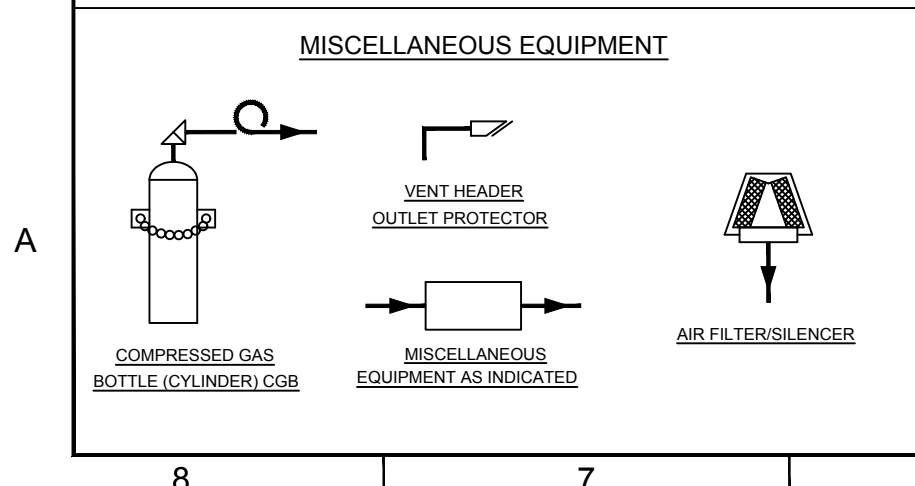
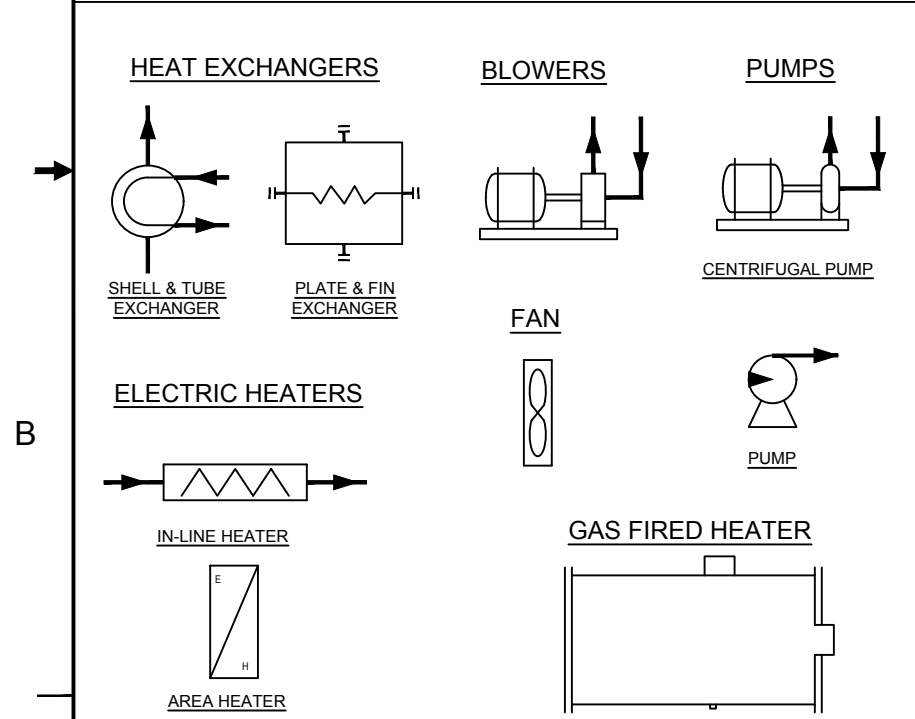
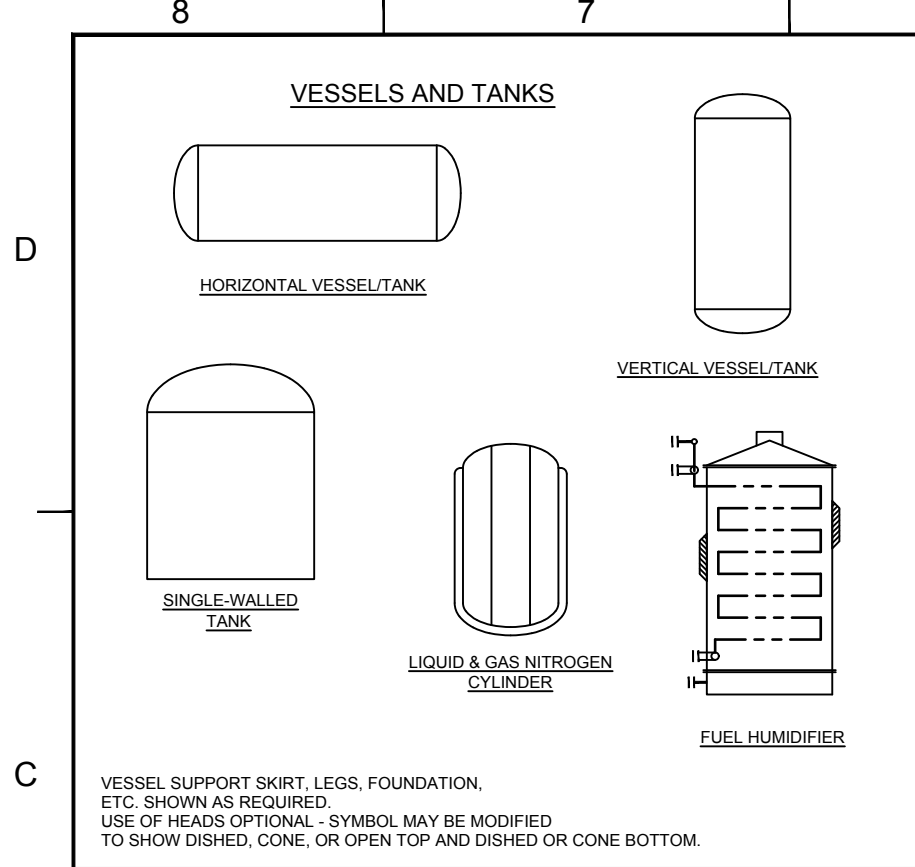
ANODE WATER SEAL  
DWG. NO.: 615S-31-02 SH. 15

RECOVERED WATER TREATMENT  
DWG. NO.: 615S-31-02 SH. 16

**GENERAL NOTES**

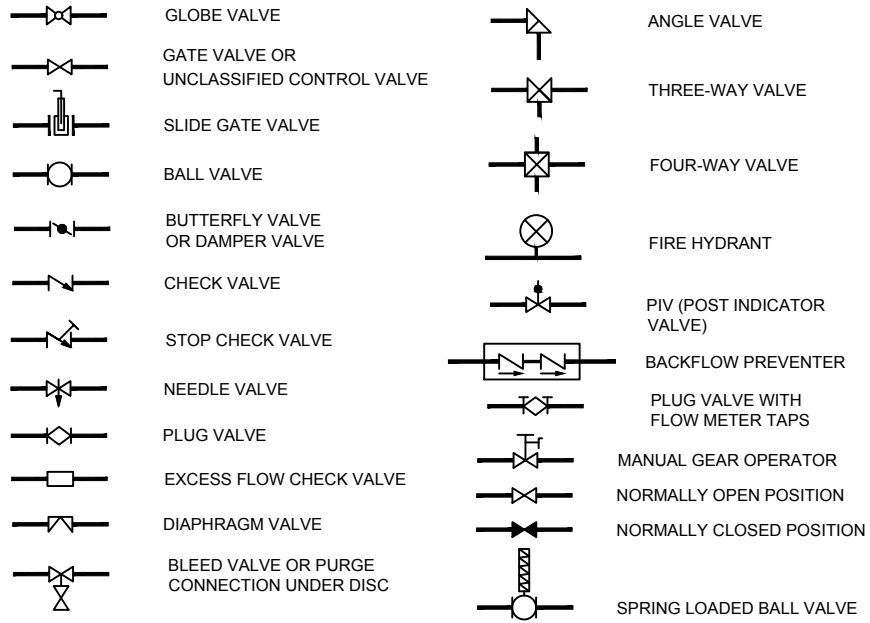
1. THE SYMBOLOGY AND IDENTIFICATION GUIDELINES SHOWN IN DRAWING NUMBER 615S-31-02 SHEETS 1, 2 & 3 IS APPLICABLE FOR DFC4000 STANDARD POWERPLANTS.
2. SEE SPECIFICATION SP-FCE-50-3 FOR PIPING & TUBING DESCRIPTION.
3. SEE SPECIFICATION SP-FCE-80-1 FOR INSULATION TYPE DESCRIPTION.
4. SEE SPECIFICATION 6085 FOR TAGGING TYPE DESCRIPTION.

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	ENGINEER: <b>M. CROWLEY</b> 09/15/15		APPROVED: <b>A. BARLOW</b> 09/15/15
	RELEASED: <b>A. HADJIST</b> 09/15/15		UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE ±1/16"
	REVISION INDICATOR FLAG NOTE		SCALE #:#
DWG NO <b>615S-31-02</b>	SHEET 1 OF 16	REV <b>8</b>	SIZE Location D ---

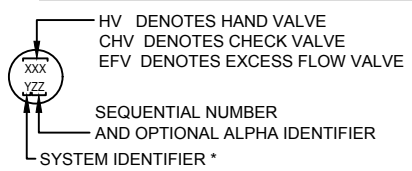


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	TITLE <b>DFC4000 POWER PLANT P&amp;ID LEGEND OF SYMBOLOGY EQUIPMENT &amp; PIPING SYMBOLS</b>		
	SIZE Location <b>D ---</b>	DWG NO <b>615S-31-02</b>	REV <b>8</b>
	SCALE <b>#:</b>	SHEET <b>2 OF 16</b>	

### VALVE SYMBOLS



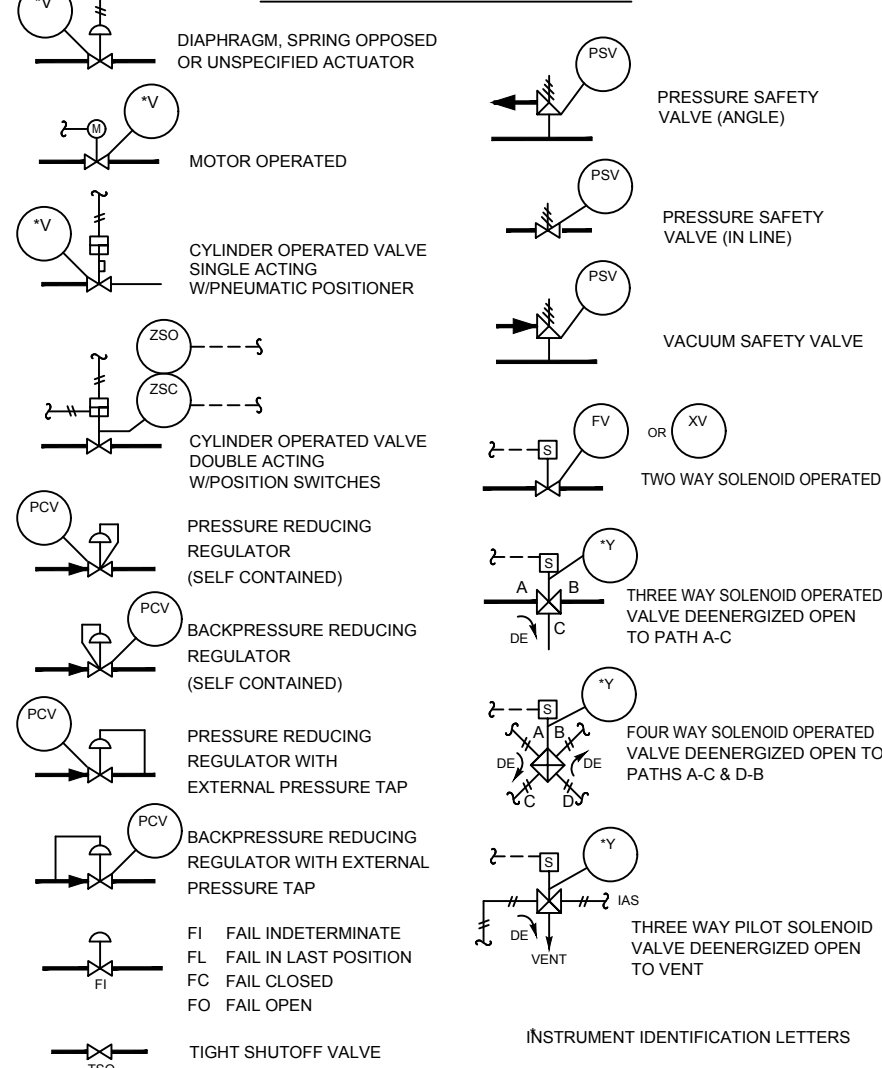
### MANUAL VALVE IDENTIFICATION



### \* SYSTEM IDENTIFIER

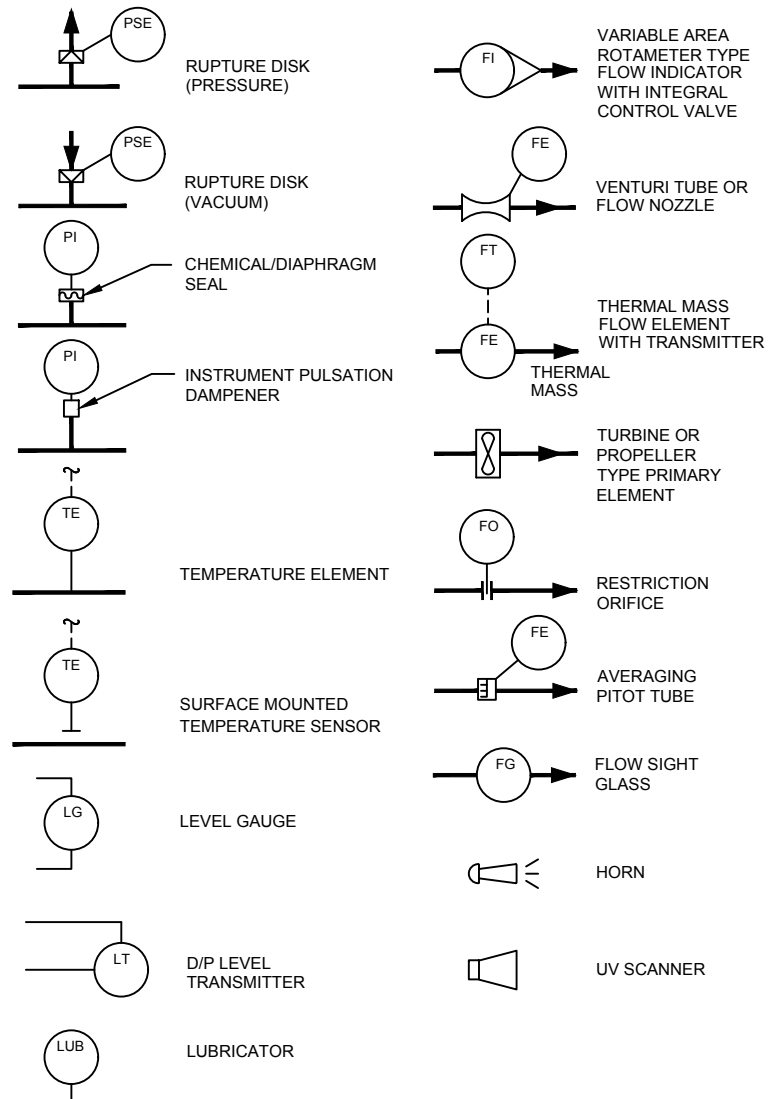
- 1 WATER TREATMENT
- 2 FUEL GAS PREPARATION
- 3 DFC MODULE
- 4 AIR SUPPLY & BURNER EXHAUST GAS
- 4 NITROGEN
- 4 ANODE COVER GAS

### CONTROL VALVE ACTUATORS

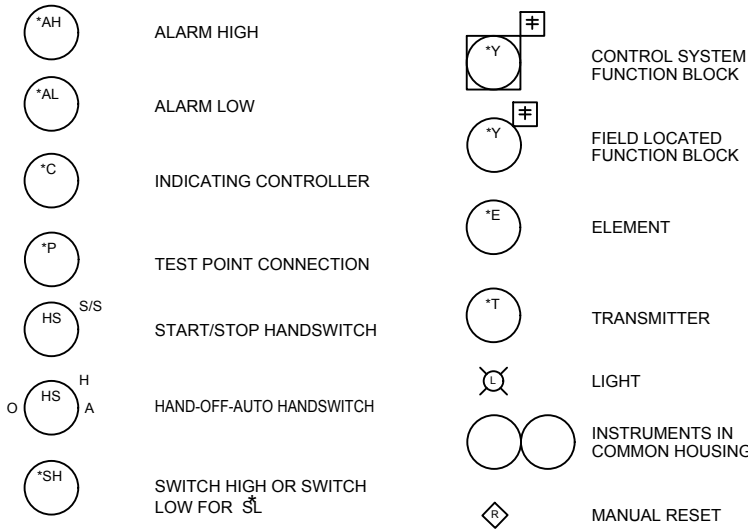


### INSTRUMENT IDENTIFICATION LETTERS

### MISCELLANEOUS INSTRUMENTS

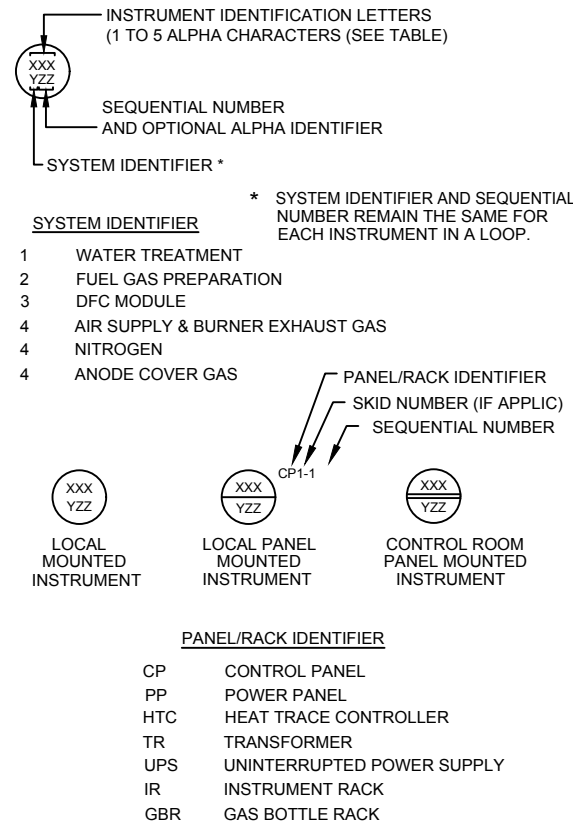


### TYPICAL INSTRUMENT SYMBOLS

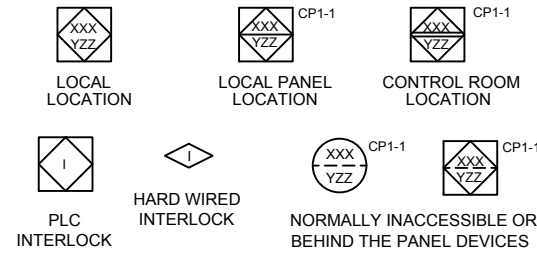


≠ SEE FUNCTION BLOCK DESIGNATIONS TABLE  
 \*INSTRUMENT IDENTIFICATION FIRST LETTER FOR MEASURED VARIABLE

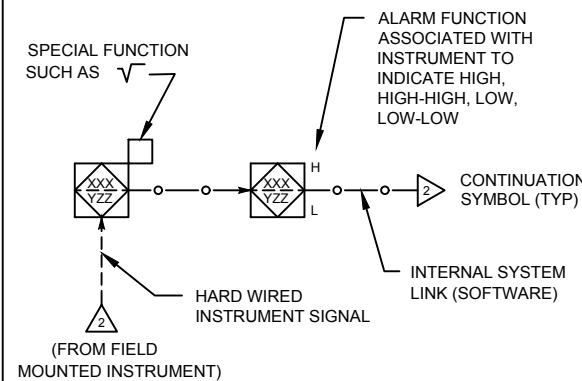
### INSTRUMENT IDENTIFICATION



### PROGRAMMABLE LOGIC CONTROL



### PLC/SHARED DISPLAY AND CONTROL



### INSTRUMENT IDENTIFICATION LETTERS

INSTRUMENT IDENTIFICATION AND SYMBOLS ARE BASED ON INSTRUMENT SOCIETY OF AMERICA STANDARDS S5.1-1984 AND S5.3-1983

FIRST LETTER	SUCCEEDING LETTERS			
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION
A	ANALYSIS		ALARM	
B	BURNER, COMBUSTION			
C	CONDUCTIVITY			CONTROL
D	DENSITY	DIFFERENTIAL		DEVIATION FROM SET POINT
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)	
F	FLOW RATE	RATIO (FRACTION)		
G	GAGING		GLASS	
H	HAND			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER	SCAN		
K	TIME, TIME SCHEDULE	TIME, RATE OF CHANGE		CONTROL STATION
L	LEVEL		LIGHT (STATUS INDICATOR)	LOW
M	MOISTURE OR HUMIDITY			MIDDLE, INTERMEDIATE
N				
O	USER'S CHOICE		ORIFICE (RESTRICTION)	OPEN (VALVE)
P	PRESSURE, VACUUM		POINT (TEST CONNECTION)	
Q	QUANTITY	INTEGRATE, TOTALIZE		
R			RECORD	
S	SPEED, FREQUENCY	SAFETY		SWITCH
T	TEMPERATURE			TRANSMIT
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, DAMPER, LOUVER
W	WEIGHT, FORCE		WELL	
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE			SOLENOID, RELAY, COMPUTE, CONVERT
Z	POSITION, DIMENSION			DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT

### FUNCTION BLOCK DESIGNATIONS

- CURRENT TO PNEUMATIC TRANSDUCER
- LO SIGNAL SELECTOR
- HI SIGNAL SELECTOR
- CHARACTERIZE y=f(x) y IS DETERMINED FROM A LOOK UP TABLE
- CHARACTERIZE y=g(x) y IS DETERMINED BY A LINEAR FUNCTION
- SQUARE ROOT
- MULTIPLY
- DIVIDE
- TOTALIZE
- AVERAGE
- DIFFERENCE
- MEDIAN SIGNAL SELECT
- OR GATE

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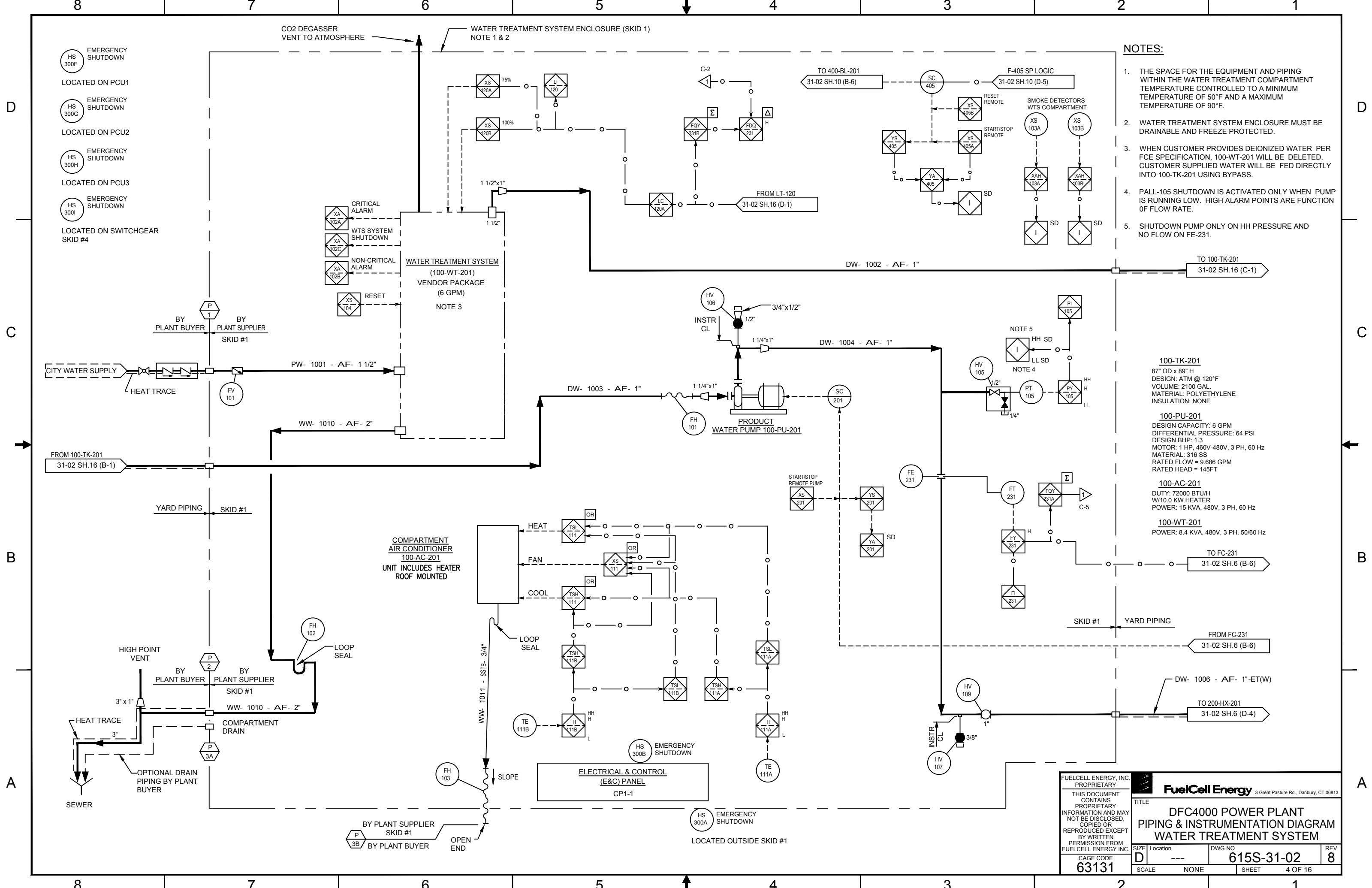
**FuelCell Energy** 3 Great Pasture Rd., Danbury, CT 06813

TITLE: **DFC4000 POWER PLANT P&ID LEGEND OF SYMBOLOGY VALVE & INSTRUMENTATION SYMBOLS**

CAGE CODE: **63131**

SIZE: D Location: --- DWG NO: **615S-31-02** REV: **8**

SCALE: ## SHEET: 3 OF 16



- NOTES:**
1. THE SPACE FOR THE EQUIPMENT AND PIPING WITHIN THE WATER TREATMENT COMPARTMENT TEMPERATURE CONTROLLED TO A MINIMUM TEMPERATURE OF 50°F AND A MAXIMUM TEMPERATURE OF 90°F.
  2. WATER TREATMENT SYSTEM ENCLOSURE MUST BE DRAINABLE AND FREEZE PROTECTED.
  3. WHEN CUSTOMER PROVIDES DEIONIZED WATER PER FCE SPECIFICATION, 100-WT-201 WILL BE DELETED. CUSTOMER SUPPLIED WATER WILL BE FED DIRECTLY INTO 100-TK-201 USING BYPASS.
  4. PALL-105 SHUTDOWN IS ACTIVATED ONLY WHEN PUMP IS RUNNING LOW. HIGH ALARM POINTS ARE FUNCTION OF FLOW RATE.
  5. SHUTDOWN PUMP ONLY ON HH PRESSURE AND NO FLOW ON FE-231.

**100-TK-201**  
 87" OD x 89" H  
 DESIGN: ATM @ 120°F  
 VOLUME: 2100 GAL.  
 MATERIAL: POLYETHYLENE  
 INSULATION: NONE

**100-PU-201**  
 DESIGN CAPACITY: 6 GPM  
 DIFFERENTIAL PRESSURE: 64 PSI  
 DESIGN BHP: 1.3  
 MOTOR: 1 HP, 460V-480V, 3 PH, 60 Hz  
 MATERIAL: 316 SS  
 RATED FLOW = 9.686 GPM  
 RATED HEAD = 145FT

**100-AC-201**  
 DUTY: 72000 BTU/H  
 W/10.0 KW HEATER  
 POWER: 15 KVA, 480V, 3 PH, 60 Hz

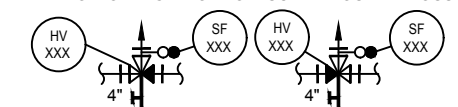
**100-WT-201**  
 POWER: 8.4 KVA, 480V, 3 PH, 50/60 Hz

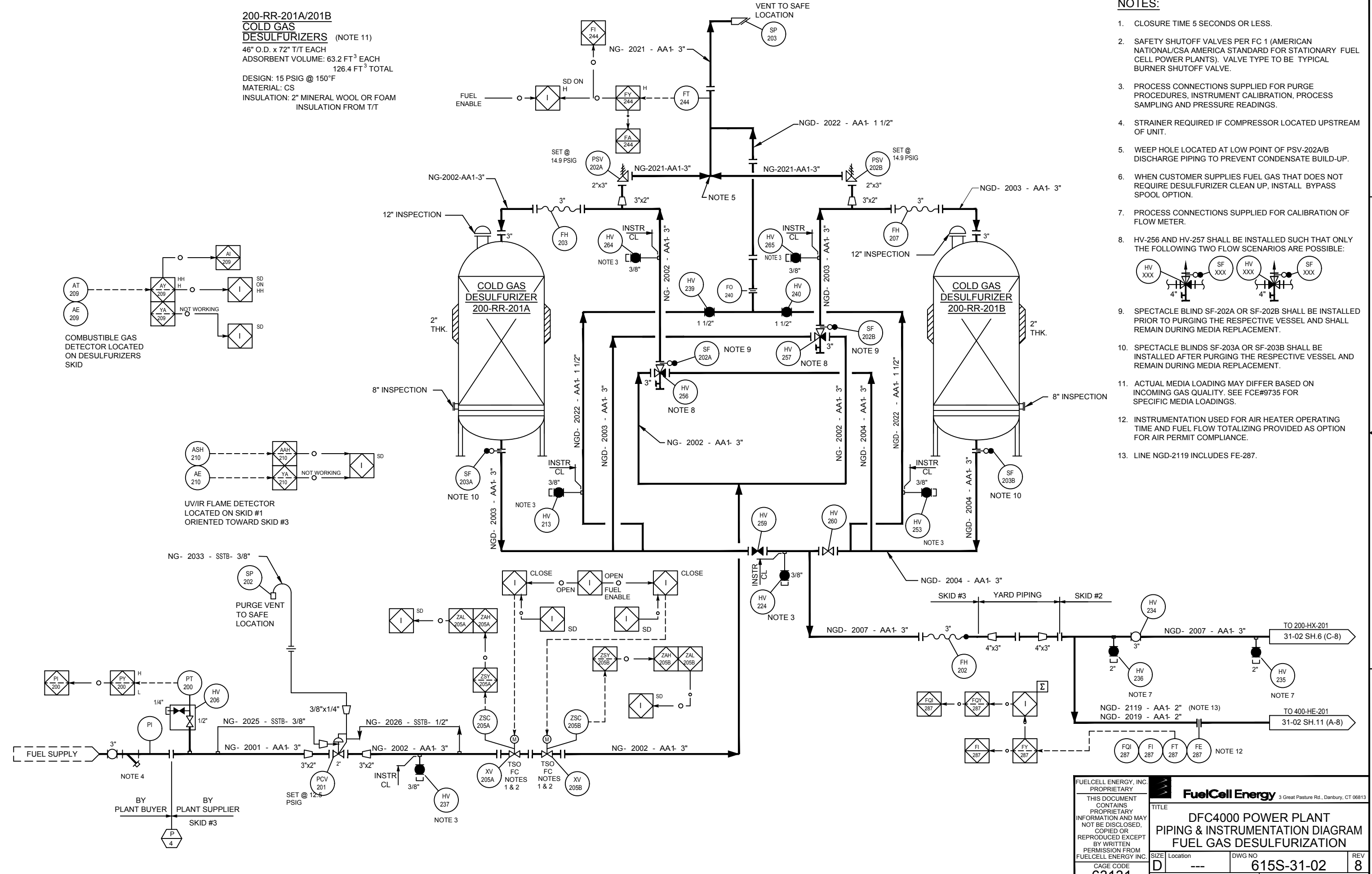
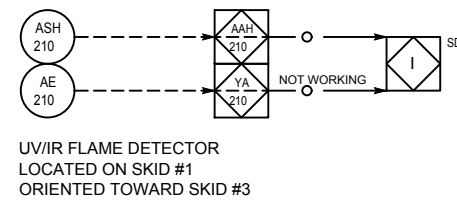
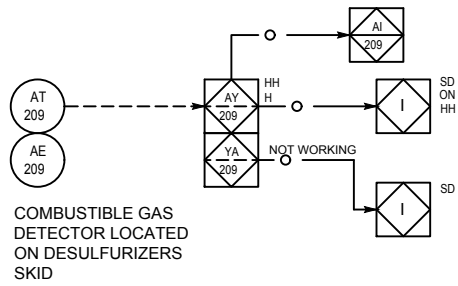
- EMERGENCY SHUTDOWN  
 HS 300F  
 LOCATED ON PCU1
- EMERGENCY SHUTDOWN  
 HS 300G  
 LOCATED ON PCU2
- EMERGENCY SHUTDOWN  
 HS 300H  
 LOCATED ON PCU3
- EMERGENCY SHUTDOWN  
 HS 300I  
 LOCATED ON SWITCHGEAR SKID #4


- CRITICAL ALARM  
 XA 102A
- WTS SYSTEM SHUTDOWN  
 XA 102C
- NON-CRITICAL ALARM  
 XA 102B
- RESET  
 XS 104

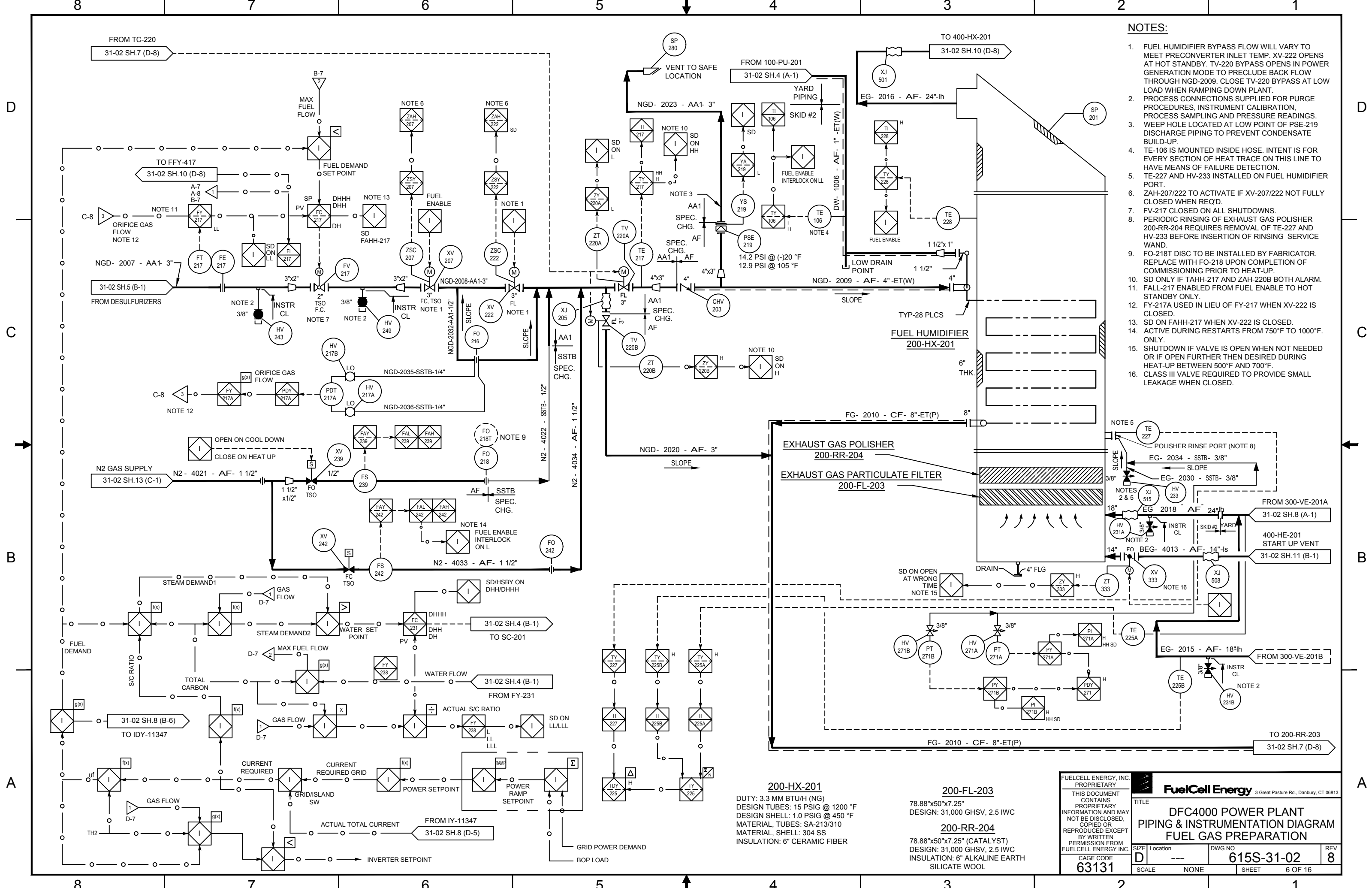
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TITLE <b>DFC4000 POWER PLANT PIPING &amp; INSTRUMENTATION DIAGRAM WATER TREATMENT SYSTEM</b>			
SIZE	Location	DWG NO	REV
D	---	615S-31-02	8
SCALE	NONE	SHEET	4 OF 16

**200-RR-201A/201B  
COLD GAS  
DESULFURIZERS** (NOTE 11)  
46" O.D. x 72" T/T EACH  
ADSORBENT VOLUME: 63.2 FT<sup>3</sup> EACH  
126.4 FT<sup>3</sup> TOTAL  
DESIGN: 15 PSIG @ 150°F  
MATERIAL: CS  
INSULATION: 2" MINERAL WOOL OR FOAM  
INSULATION FROM T/T

- NOTES:**
- CLOSURE TIME 5 SECONDS OR LESS.
  - SAFETY SHUTOFF VALVES PER FC 1 (AMERICAN NATIONAL/CSA AMERICA STANDARD FOR STATIONARY FUEL CELL POWER PLANTS). VALVE TYPE TO BE TYPICAL BURNER SHUTOFF VALVE.
  - PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
  - STRAINER REQUIRED IF COMPRESSOR LOCATED UPSTREAM OF UNIT.
  - WEEP HOLE LOCATED AT LOW POINT OF PSV-202A/B DISCHARGE PIPING TO PREVENT CONDENSATE BUILD-UP.
  - WHEN CUSTOMER SUPPLIES FUEL GAS THAT DOES NOT REQUIRE DESULFURIZER CLEAN UP, INSTALL BYPASS SPOOL OPTION.
  - PROCESS CONNECTIONS SUPPLIED FOR CALIBRATION OF FLOW METER.
  - HV-256 AND HV-257 SHALL BE INSTALLED SUCH THAT ONLY THE FOLLOWING TWO FLOW SCENARIOS ARE POSSIBLE:
 
  - SPECTACLE BLIND SF-202A OR SF-202B SHALL BE INSTALLED PRIOR TO PURGING THE RESPECTIVE VESSEL AND SHALL REMAIN DURING MEDIA REPLACEMENT.
  - SPECTACLE BLINDS SF-203A OR SF-203B SHALL BE INSTALLED AFTER PURGING THE RESPECTIVE VESSEL AND REMAIN DURING MEDIA REPLACEMENT.
  - ACTUAL MEDIA LOADING MAY DIFFER BASED ON INCOMING GAS QUALITY. SEE FCE#9735 FOR SPECIFIC MEDIA LOADINGS.
  - INSTRUMENTATION USED FOR AIR HEATER OPERATING TIME AND FUEL FLOW TOTALIZING PROVIDED AS OPTION FOR AIR PERMIT COMPLIANCE.
  - LINE NGD-2119 INCLUDES FE-287.



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<b>TITLE</b> DFC4000 POWER PLANT PIPING & INSTRUMENTATION DIAGRAM FUEL GAS DESULFURIZATION			
<b>SIZE</b> D	<b>Location</b> ---	<b>DWG NO</b> 615S-31-02	<b>REV</b> 8
<b>SCALE</b> NONE	<b>SHEET</b> 5 OF 16		



- NOTES:**
- FUEL HUMIDIFIER BYPASS FLOW WILL VARY TO MEET PRECONVERTER INLET TEMP. XV-222 OPENS AT HOT STANDBY. TV-220 BYPASS OPENS IN POWER GENERATION MODE TO PRECLUDE BACK FLOW THROUGH NGD-2009. CLOSE TV-220 BYPASS AT LOW LOAD WHEN RAMPING DOWN PLANT.
  - PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
  - WEEP HOLE LOCATED AT LOW POINT OF PSE-219 DISCHARGE LINED TO PREVENT CONDENSATE BUILD-UP.
  - TE-106 IS MOUNTED INSIDE HOSE. INTENT IS FOR EVERY SECTION OF HEAT TRACE ON THIS LINE TO HAVE MEANS OF FAILURE DETECTION.
  - TE-227 AND HV-233 INSTALLED ON FUEL HUMIDIFIER PORT.
  - ZAH-207/222 TO ACTIVATE IF XV-207/222 NOT FULLY CLOSED WHEN REQ'D.
  - FV-217 CLOSED ON ALL SHUTDOWNS.
  - PERIODIC RINSING OF EXHAUST GAS POLISHER 200-RR-204 REQUIRES REMOVAL OF TE-227 AND HV-233 BEFORE INSERTION OF RINSING SERVICE WAND.
  - FO-218T DISC TO BE INSTALLED BY FABRICATOR. REPLACE WITH FO-218 UPON COMPLETION OF COMMISSIONING PRIOR TO HEAT-UP.
  - SD ONLY IF TAHH-217 AND ZAH-220B BOTH ALARM.
  - FALL-217 ENABLED FROM FUEL ENABLE TO HOT STANDBY ONLY.
  - FY-217A USED IN LIEU OF FY-217 WHEN XV-222 IS CLOSED.
  - SD ON FAHH-217 WHEN XV-222 IS CLOSED.
  - ACTIVE DURING RESTARTS FROM 750°F TO 1000°F ONLY.
  - SHUTDOWN IF VALVE IS OPEN WHEN NOT NEEDED OR IF OPEN FURTHER THEN DESIRED DURING HEAT-UP BETWEEN 500°F AND 700°F.
  - CLASS III VALVE REQUIRED TO PROVIDE SMALL LEAKAGE WHEN CLOSED.

**200-HX-201**  
 DUTY: 3.3 MM BTU/H (NG)  
 DESIGN TUBES: 15 PSIG @ 1200 °F  
 DESIGN SHELL: 1.0 PSIG @ 450 °F  
 MATERIAL, TUBES: SA-213/310  
 MATERIAL, SHELL: 304 SS  
 INSULATION: 6" CERAMIC FIBER

**200-FL-203**  
 78.88"x50"x7.25"  
 DESIGN: 31,000 GHSV, 2.5 IWC

**200-RR-204**  
 78.88"x50"x7.25" (CATALYST)  
 DESIGN: 31,000 GHSV, 2.5 IWC  
 INSULATION: 6" ALKALINE EARTH SILICATE WOOL

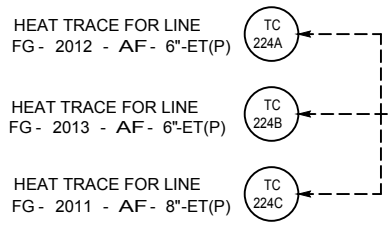
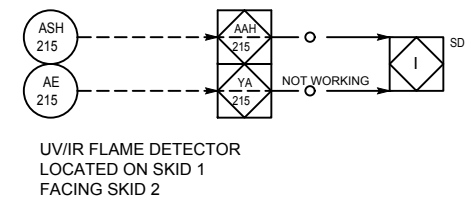
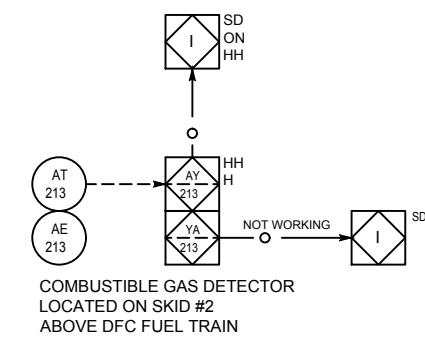
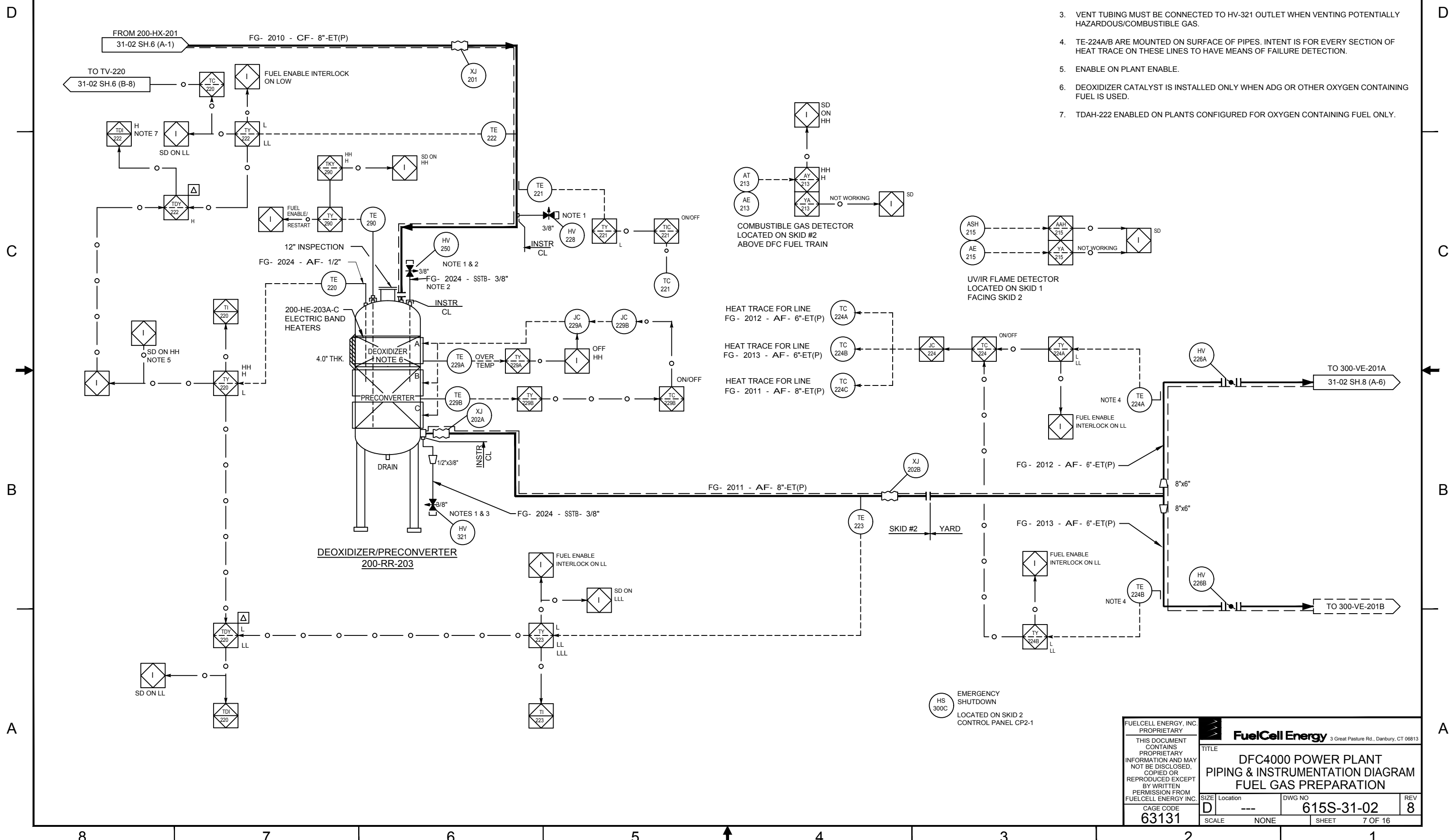
<b>FuelCell Energy</b> <small>3 Great Pasture Rd., Danbury, CT 06813</small>	
<b>DFC4000 POWER PLANT</b> <b>PIPING &amp; INSTRUMENTATION DIAGRAM</b> <b>FUEL GAS PREPARATION</b>	
CAGE CODE <b>63131</b>	DWG NO <b>615S-31-02</b>
REV <b>8</b>	SHEET <b>6 OF 16</b>

**200-HE-203A-C**  
 3 BANDS x 7kW= 21kW  
 EACH BAND CONSISTS OF 3 SECTIONS

**200-RR-203**  
 42" OD x 68" T/T  
 CATALYST VOLUME: 20.8 FT<sup>3</sup>/8.4 FT<sup>3</sup>  
 DESIGN: 15 PSIG @ 1000 °F  
 MATERIAL: 304/304L SS DUAL CERT.  
 INSULATION: 4" TOTAL THICKNESS  
 REMOVEABLE CERAMIC FIBER OVER  
 MANWAY

**NOTES:**

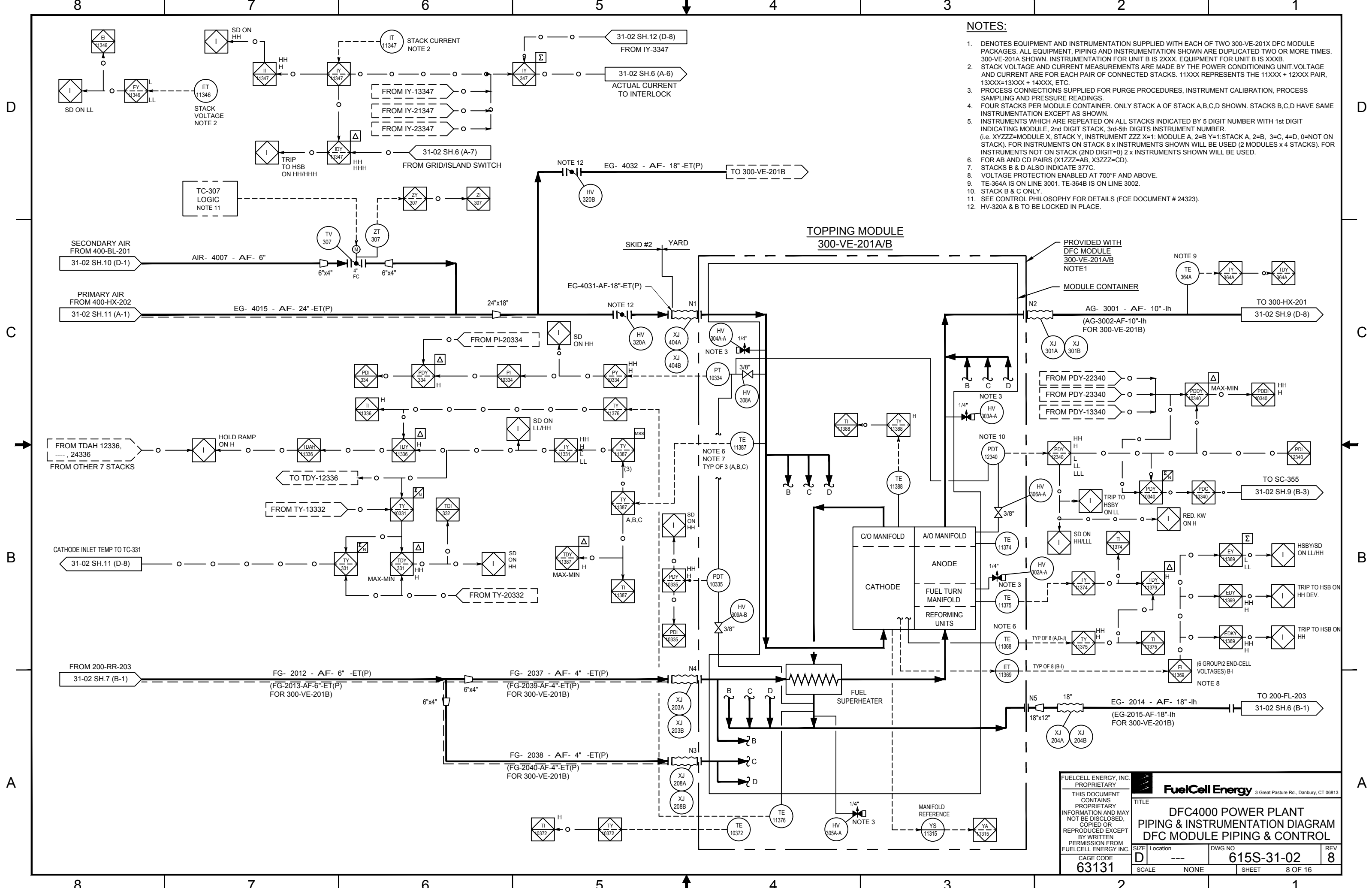
1. PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
2. HV-250 PORTION OF LINE FG-2024-SSTB-3/8" IS ONLY REQUIRED FOR ADG APPLICATIONS.
3. VENT TUBING MUST BE CONNECTED TO HV-321 OUTLET WHEN VENTING POTENTIALLY HAZARDOUS/COMBUSTIBLE GAS.
4. TE-224A/B ARE MOUNTED ON SURFACE OF PIPES. INTENT IS FOR EVERY SECTION OF HEAT TRACE ON THESE LINES TO HAVE MEANS OF FAILURE DETECTION.
5. ENABLE ON PLANT ENABLE.
6. DEOXIDIZER CATALYST IS INSTALLED ONLY WHEN ADG OR OTHER OXYGEN CONTAINING FUEL IS USED.
7. TDAH-222 ENABLED ON PLANTS CONFIGURED FOR OXYGEN CONTAINING FUEL ONLY.



EMERGENCY SHUTDOWN  
 HS 300C  
 LOCATED ON SKID 2 CONTROL PANEL CP2-1

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TITLE	DFC4000 POWER PLANT PIPING & INSTRUMENTATION DIAGRAM FUEL GAS PREPARATION		
SIZE	Location	DWG NO	REV
D	---	615S-31-02	8
CAGE CODE	SCALE	SHEET	
63131	NONE	7 OF 16	

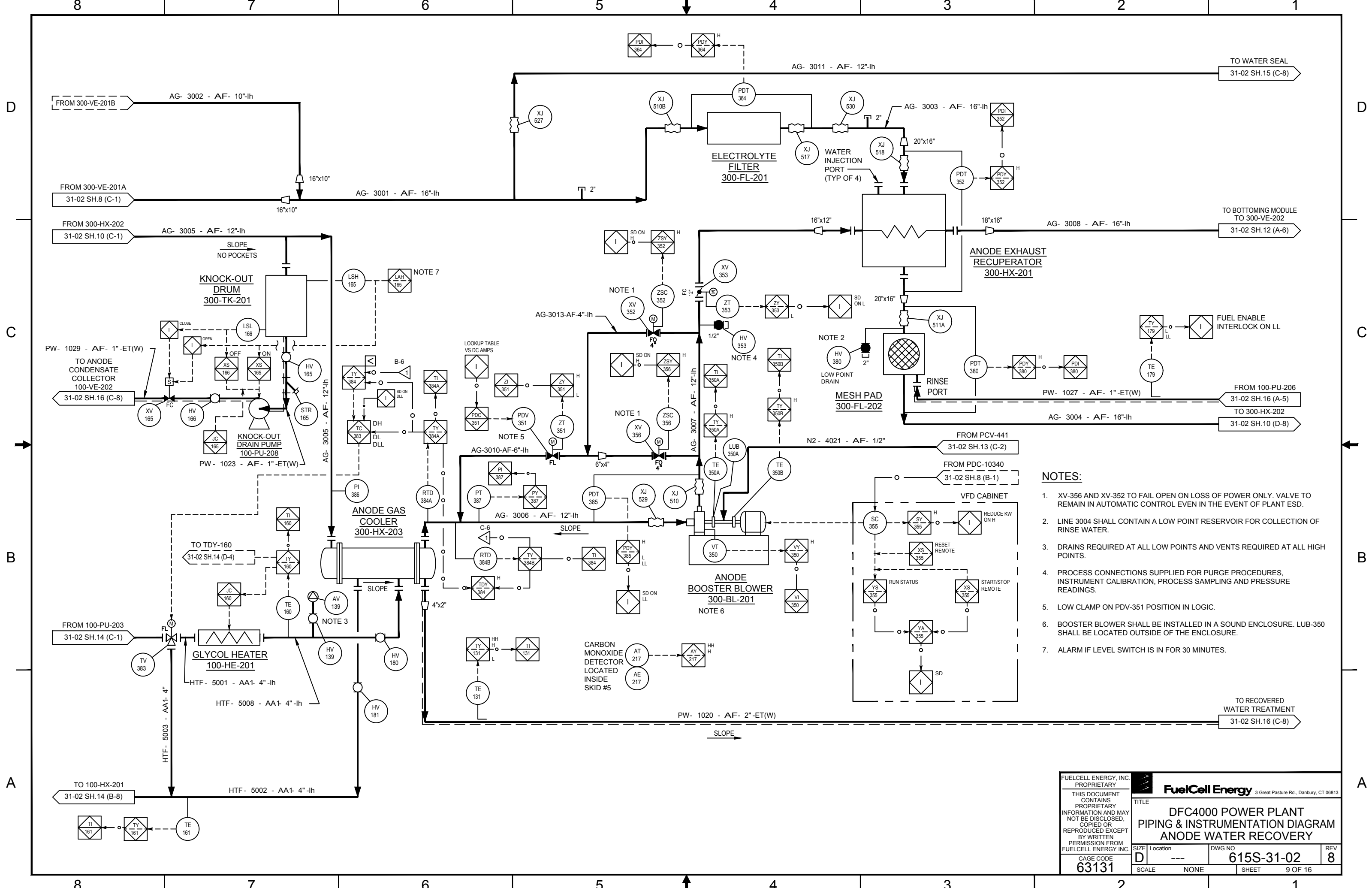




**NOTES:**

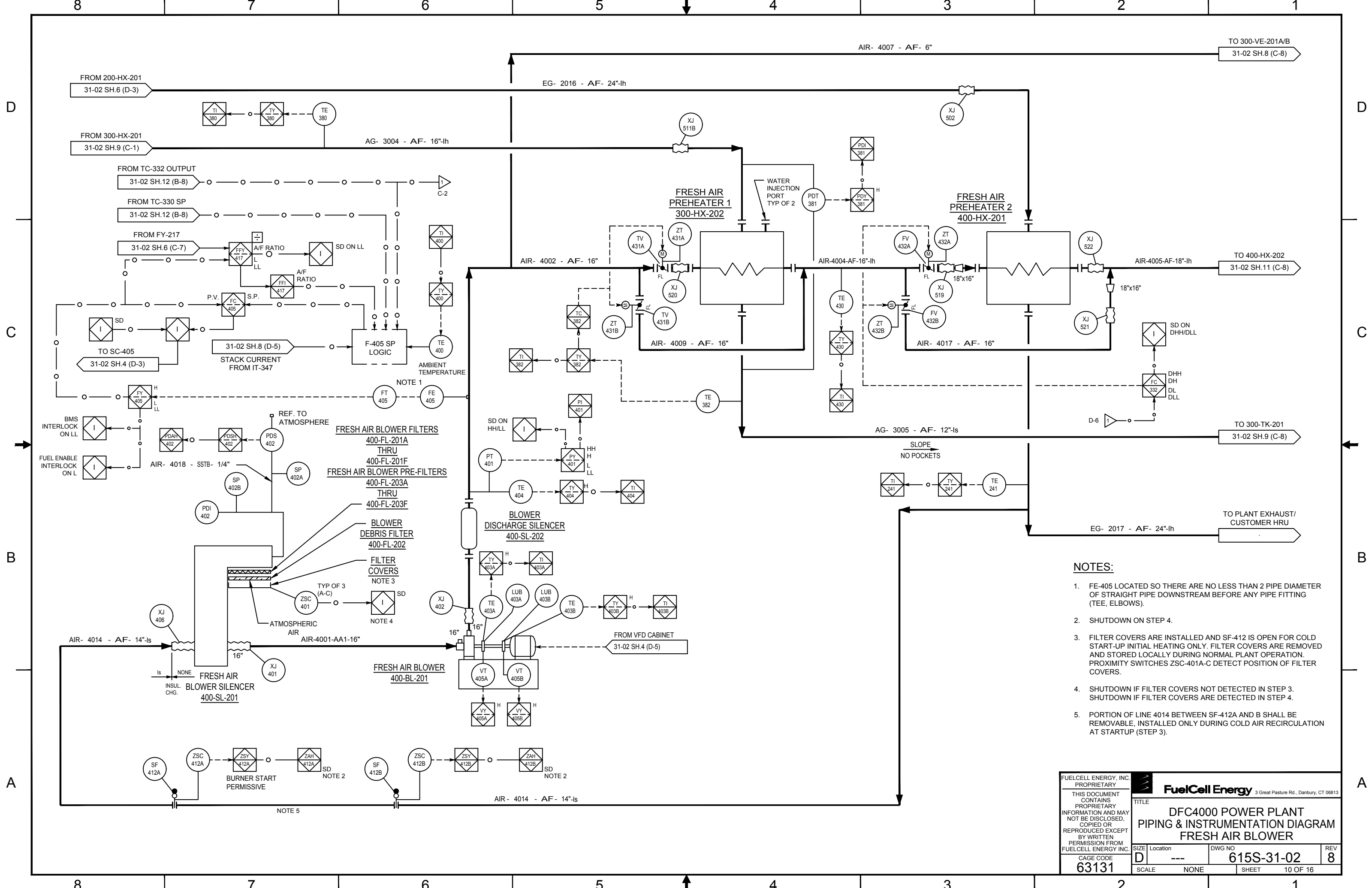
1. DENOTES EQUIPMENT AND INSTRUMENTATION SUPPLIED WITH EACH OF TWO 300-VE-201X DFC MODULE PACKAGES. ALL EQUIPMENT, PIPING AND INSTRUMENTATION SHOWN ARE DUPLICATED TWO OR MORE TIMES. 300-VE-201A SHOWN. INSTRUMENTATION FOR UNIT B IS 2XXX. EQUIPMENT FOR UNIT B IS XXXB.
2. STACK VOLTAGE AND CURRENT MEASUREMENTS ARE MADE BY THE POWER CONDITIONING UNIT. VOLTAGE AND CURRENT ARE FOR EACH PAIR OF CONNECTED STACKS. 11XXX REPRESENTS THE 11XXX + 12XXX PAIR, 13XXX=13XXX + 14XXX, ETC.
3. PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
4. FOUR STACKS PER MODULE CONTAINER. ONLY STACK A OF STACK A,B,C,D SHOWN. STACKS B,C,D HAVE SAME INSTRUMENTATION EXCEPT AS SHOWN.
5. INSTRUMENTS WHICH ARE REPEATED ON ALL STACKS INDICATED BY 5 DIGIT NUMBER WITH 1st DIGIT INDICATING MODULE, 2nd DIGIT STACK, 3rd-5th DIGITS INSTRUMENT NUMBER. (i.e. XYZZZ=MODULE X, STACK Y, INSTRUMENT ZZZ X=1: MODULE A, 2=B Y=1: STACK A, 2=B, 3=C, 4=D, 0=NOT ON STACK). FOR INSTRUMENTS ON STACK 8 x INSTRUMENTS SHOWN WILL BE USED (2 MODULES x 4 STACKS). FOR INSTRUMENTS NOT ON STACK (2ND DIGIT=0) 2 x INSTRUMENTS SHOWN WILL BE USED.
6. FOR AB AND CD PAIRS (X1ZZZ=AB, X3ZZZ=CD).
7. STACKS B & D ALSO INDICATE 377C.
8. VOLTAGE PROTECTION ENABLED AT 700°F AND ABOVE.
9. TE-364A IS ON LINE 3001. TE-364B IS ON LINE 3002.
10. STACK B & C ONLY.
11. SEE CONTROL PHILOSOPHY FOR DETAILS (FCE DOCUMENT # 24232).
12. HV-320A & B TO BE LOCKED IN PLACE.

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<b>TITLE</b> DFC4000 POWER PLANT PIPING & INSTRUMENTATION DIAGRAM DFC MODULE PIPING & CONTROL			
<b>CAGE CODE</b> 63131	<b>SIZE</b> D	<b>DWG NO</b> 615S-31-02	<b>REV</b> 8
<b>SCALE</b> NONE	<b>LOCATION</b> ---	<b>SHEET</b> 8 OF 16	



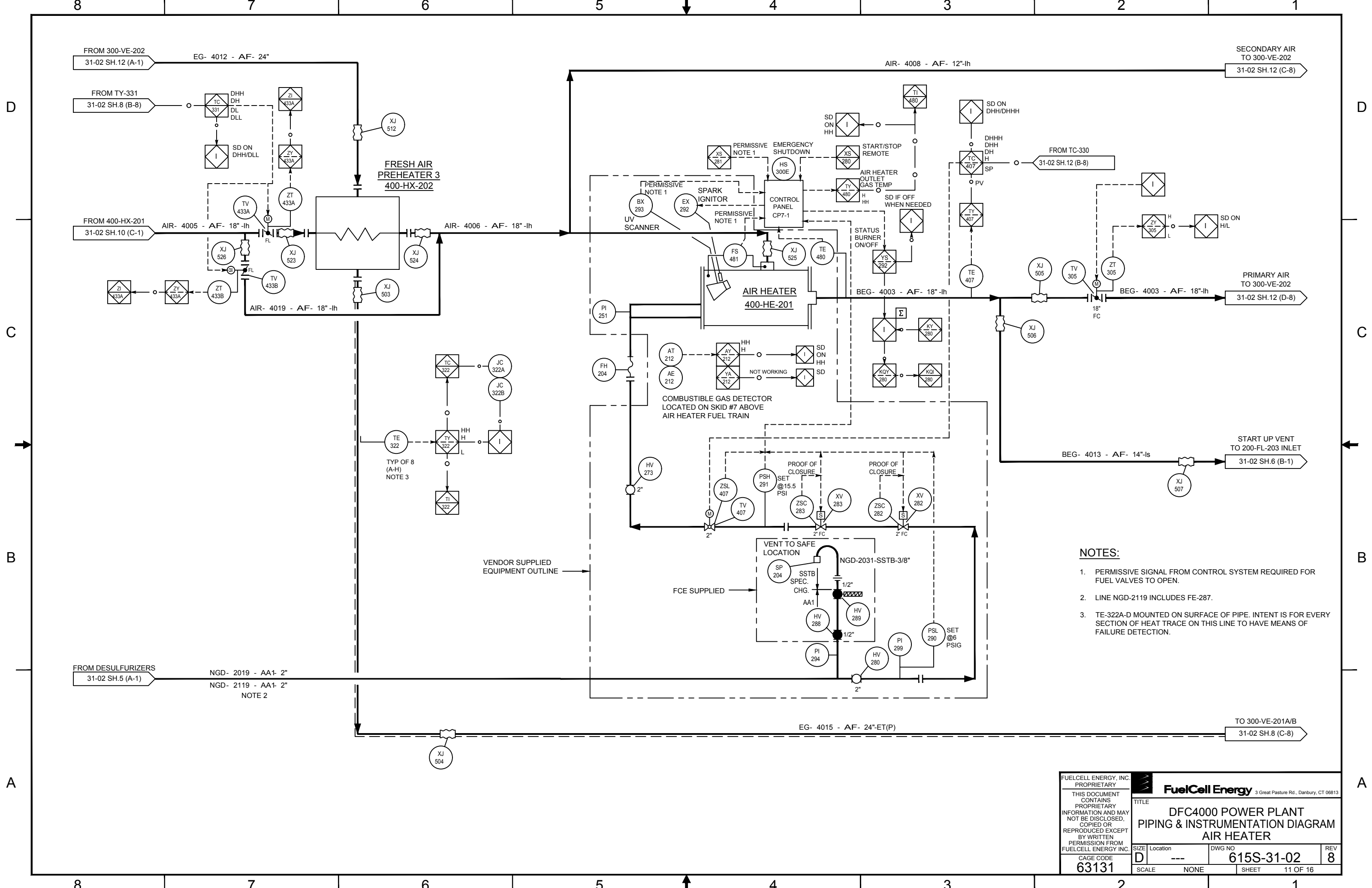
- NOTES:**
- XV-356 AND XV-352 TO FAIL OPEN ON LOSS OF POWER ONLY. VALVE TO REMAIN IN AUTOMATIC CONTROL EVEN IN THE EVENT OF PLANT ESD.
  - LINE 3004 SHALL CONTAIN A LOW POINT RESERVOIR FOR COLLECTION OF RINSE WATER.
  - DRAINS REQUIRED AT ALL LOW POINTS AND VENTS REQUIRED AT ALL HIGH POINTS.
  - PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
  - LOW CLAMP ON PDV-351 POSITION IN LOGIC.
  - BOOSTER BLOWER SHALL BE INSTALLED IN A SOUND ENCLOSURE. LUB-350 SHALL BE LOCATED OUTSIDE OF THE ENCLOSURE.
  - ALARM IF LEVEL SWITCH IS IN FOR 30 MINUTES.

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<b>TITLE</b> DFC4000 POWER PLANT PIPING & INSTRUMENTATION DIAGRAM ANODE WATER RECOVERY			
<b>SIZE</b> D	<b>Location</b> ---	<b>DWG NO</b> 615S-31-02	<b>REV</b> 8
<b>SCALE</b> NONE	<b>SHEET</b> 9 OF 16		



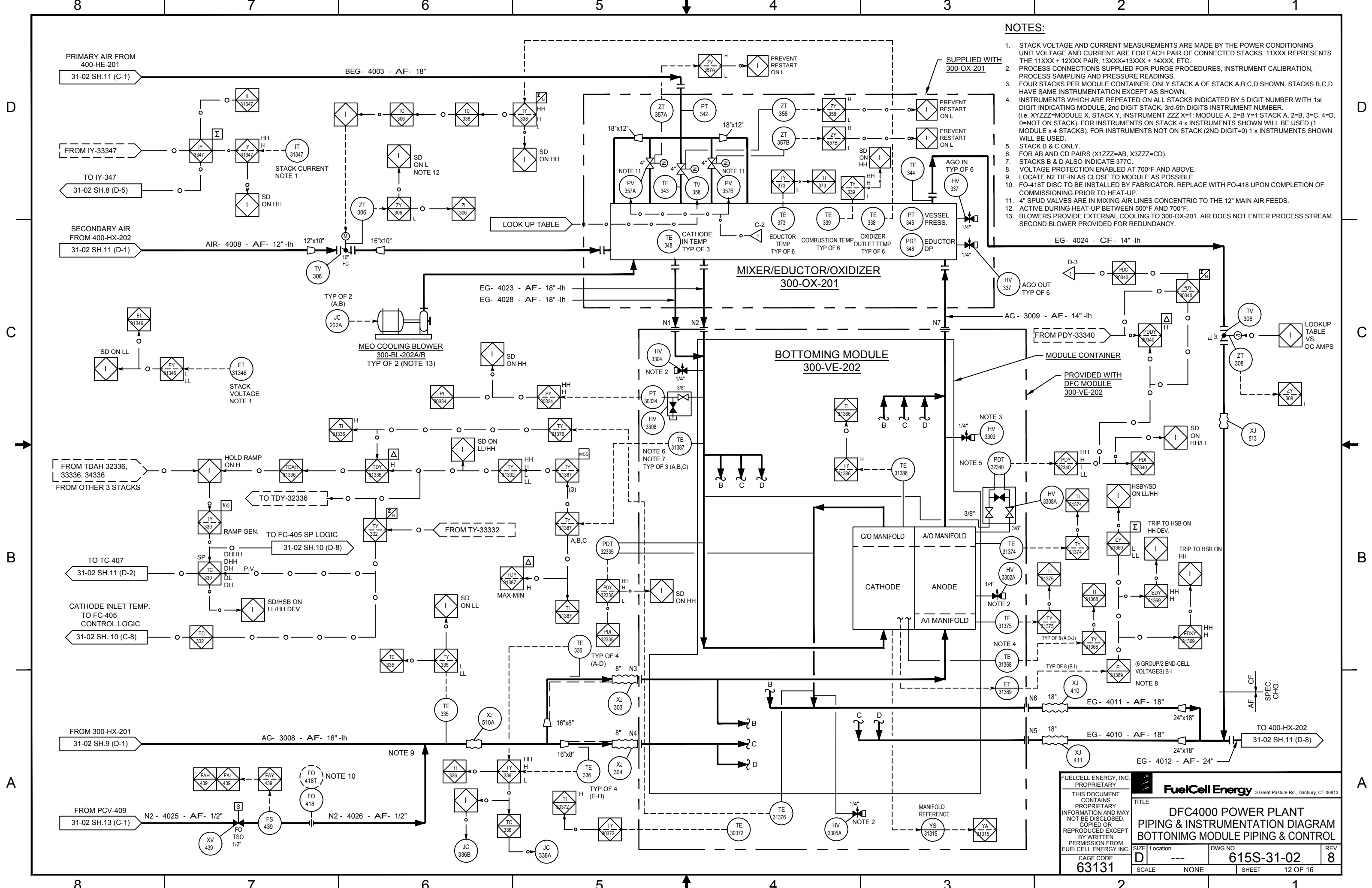
- NOTES:**
1. FE-405 LOCATED SO THERE ARE NO LESS THAN 2 PIPE DIAMETER OF STRAIGHT PIPE DOWNSTREAM BEFORE ANY PIPE FITTING (TEE, ELBOWS).
  2. SHUTDOWN ON STEP 4.
  3. FILTER COVERS ARE INSTALLED AND SF-412 IS OPEN FOR COLD START-UP INITIAL HEATING ONLY. FILTER COVERS ARE REMOVED AND STORED LOCALLY DURING NORMAL PLANT OPERATION. PROXIMITY SWITCHES ZSC-401A-C DETECT POSITION OF FILTER COVERS.
  4. SHUTDOWN IF FILTER COVERS NOT DETECTED IN STEP 3. SHUTDOWN IF FILTER COVERS ARE DETECTED IN STEP 4.
  5. PORTION OF LINE 4014 BETWEEN SF-412A AND B SHALL BE REMOVABLE, INSTALLED ONLY DURING COLD AIR RECIRCULATION AT STARTUP (STEP 3).

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	TITLE <b>DFC4000 POWER PLANT          PIPING &amp; INSTRUMENTATION DIAGRAM          FRESH AIR BLOWER</b>		
	SIZE Location <b>D ---</b>	DWG NO <b>615S-31-02</b>	REV <b>8</b>
	SCALE NONE	SHEET 10 OF 16	



- NOTES:**
1. PERMISSIVE SIGNAL FROM CONTROL SYSTEM REQUIRED FOR FUEL VALVES TO OPEN.
  2. LINE NGD-2119 INCLUDES FE-287.
  3. TE-322A-D MOUNTED ON SURFACE OF PIPE. INTENT IS FOR EVERY SECTION OF HEAT TRACE ON THIS LINE TO HAVE MEANS OF FAILURE DETECTION.

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	TITLE <b>DFC4000 POWER PLANT          PIPING &amp; INSTRUMENTATION DIAGRAM          AIR HEATER</b>		
	SIZE Location <b>D ---</b>	DWG NO <b>615S-31-02</b>	REV <b>8</b>
	SCALE NONE	SHEET 11 OF 16	



**NOTES:**

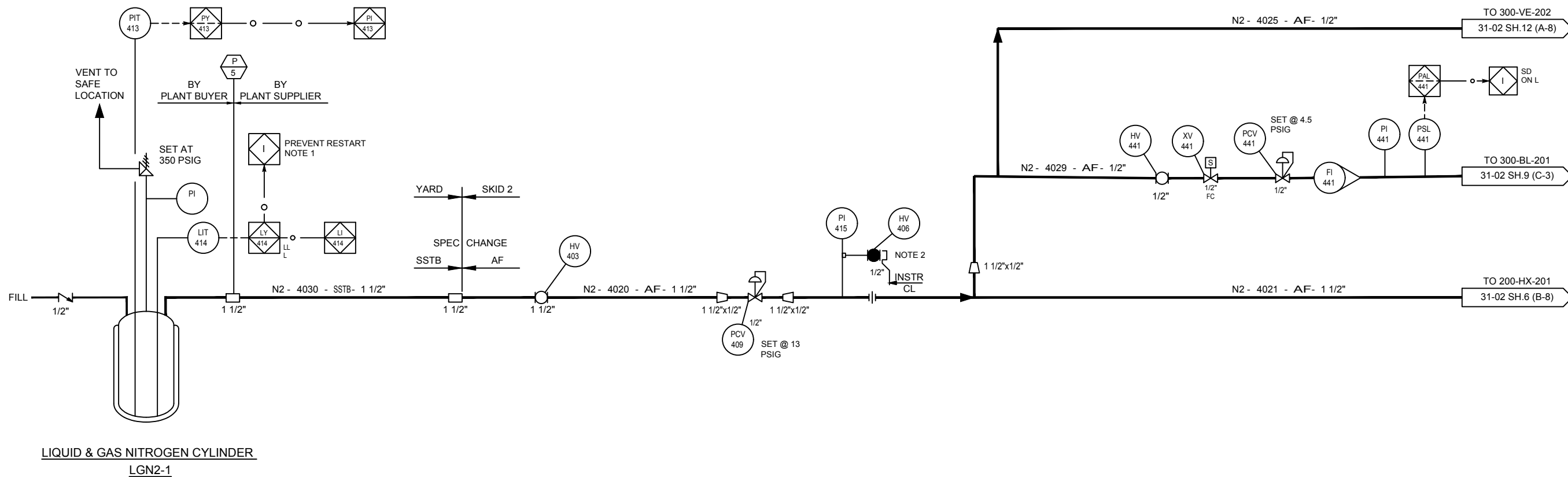
1. STACK VOLTAGE AND CURRENT MEASUREMENTS ARE MADE BY THE POWER CONDITIONING UNIT. VOLTAGE AND CURRENT ARE FOR EACH PAIR OF CONNECTED STACKS. 11XXX REPRESENTS THE 11XXX + 12XXX PAIR, 13XXX=13XXX + 14XXX, ETC.
2. PROCESS CONNECTIONS SUPPLIED FOR PURGE PROCEDURES, INSTRUMENT CALIBRATION, PROCESS SAMPLING AND PRESSURE READINGS.
3. FOUR STACKS PER MODULE CONTAINER. ONLY STACK A OF STACK A,B,C,D SHOWN. STACKS B,C,D HAVE SAME INSTRUMENTATION EXCEPT AS SHOWN.
4. INSTRUMENTS WHICH ARE REPEATED ON ALL STACKS INDICATED BY 5 DIGIT NUMBER WITH 1st DIGIT INDICATING MODULE, 2nd DIGIT STACK, 3rd-5th DIGITS INSTRUMENT NUMBER. (i.e. XYZZZ=MODULE X, STACK Y, INSTRUMENT ZZZ X=1: MODULE A, 2=B Y=1: STACK A, 2=B, 3=C, 4=D, 0=NOT ON STACK). FOR INSTRUMENTS ON STACK 4 x INSTRUMENTS SHOWN WILL BE USED (1 MODULE x 4 STACKS). FOR INSTRUMENTS NOT ON STACK (2ND DIGIT=0) 1 x INSTRUMENTS SHOWN WILL BE USED.
5. STACK B & C ONLY.
6. FOR AB AND CD PAIRS (X1ZZZ=AB, X3ZZZ=CD).
7. STACKS B & D ALSO INDICATE 377C.
8. VOLTAGE PROTECTION ENABLED AT 700°F AND ABOVE.
9. LOCATE N2 TIE-IN AS CLOSE TO MODULE AS POSSIBLE.
10. FO-418T DISC TO BE INSTALLED BY FABRICATOR. REPLACE WITH FO-418 UPON COMPLETION OF COMMISSIONING PRIOR TO HEAT-UP.
11. 4" SPUD VALVES ARE IN MIXING AIR LINES CONCENTRIC TO THE 12" MAIN AIR FEEDS.
12. ACTIVE DURING HEAT-UP BETWEEN 500°F AND 700°F.
13. BLOWERS PROVIDE EXTERNAL COOLING TO 300-OX-201. AIR DOES NOT ENTER PROCESS STREAM. SECOND BLOWER PROVIDED FOR REDUNDANCY.

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<b>DFC4000 POWER PLANT</b> <b>PIPING &amp; INSTRUMENTATION DIAGRAM</b> <b>BOTTOMING MODULE PIPING &amp; CONTROL</b>	
SIZE Location <b>D</b> ---	DWG NO <b>615S-31-02</b>
CAGE CODE <b>63131</b>	REV <b>8</b>
SCALE NONE	SHEET 12 OF 16

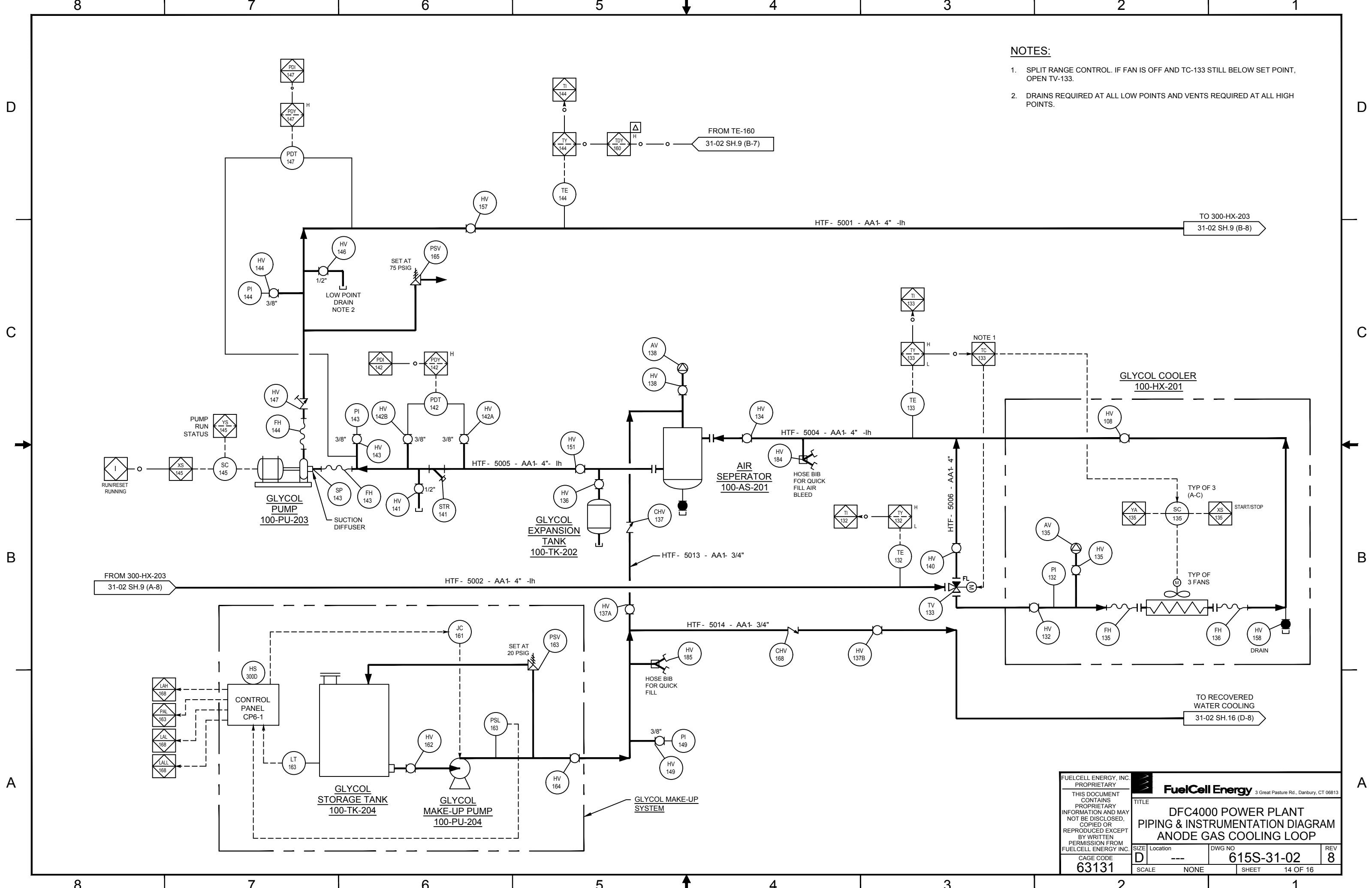
**LGN2-1**  
 42" O.D. x 81" H  
 DESIGN: 350 PSIG  
 VOLUME: 33.55 CU. FT.

**NOTES:**

1. PLANT CANNOT BE STARTED IF N2 LEVEL IS LESS THAN LOW SETPOINT.
2. CONNECTION FOR MODULE PURGE DURING INSTALLATION USING COMPRESSED N2 AND AN EXTERNAL REGULATOR IF LIQUID N2 IS NOT YET AVAILABLE.
3. COMPRESSED N2 GAS OPTION TO BE DEVELOPED UPON CUSTOMER ORDER.



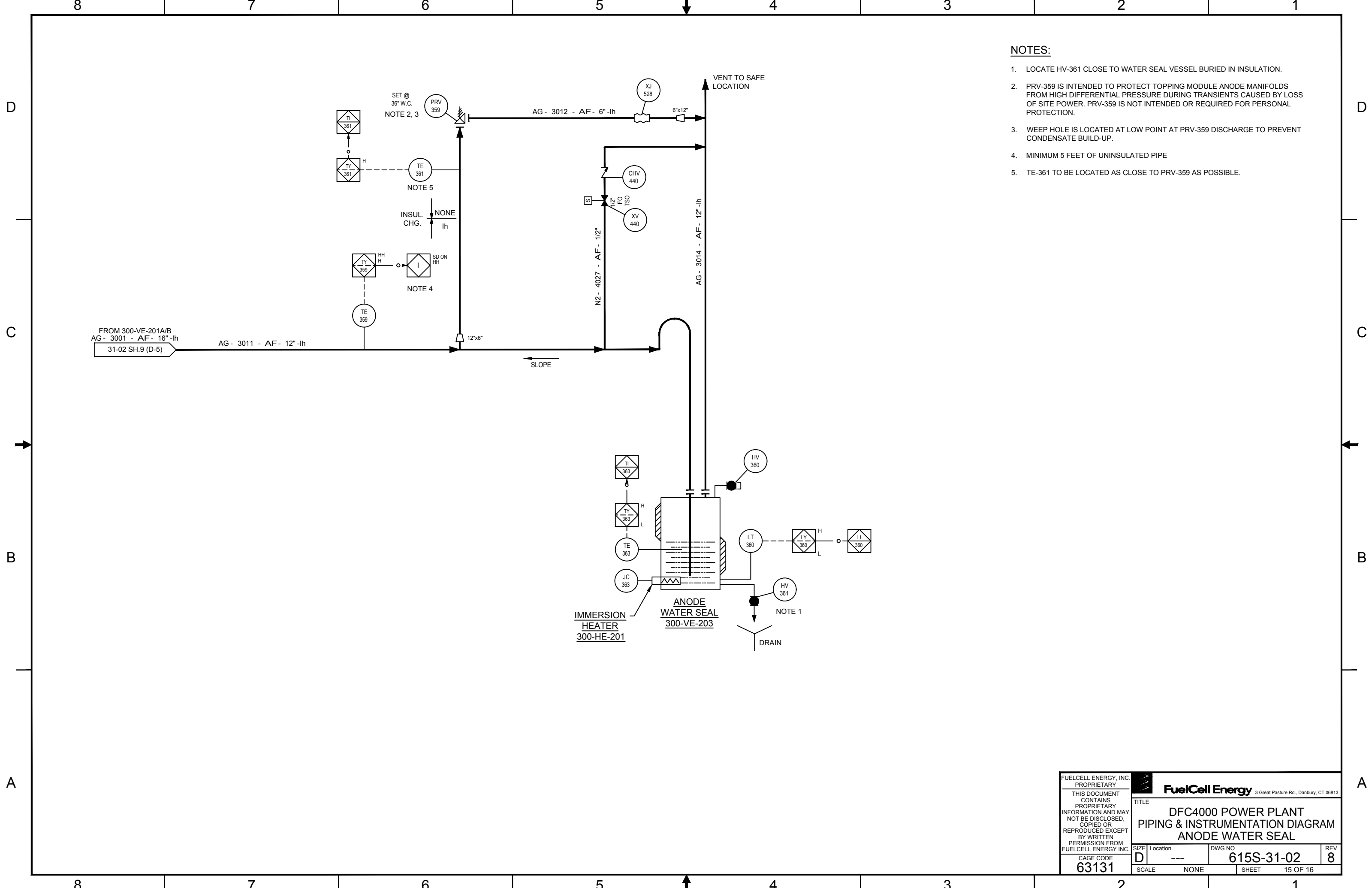
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TITLE <b>DFC4000 POWER PLANT          PIPING &amp; INSTRUMENTATION DIAGRAM          LIQUID NITROGEN MICROBULK</b>			
CAGE CODE <b>63131</b>	SIZE Location <b>D ---</b>	DWG NO <b>615S-31-02</b>	REV <b>8</b>
SCALE NONE		SHEET 13 OF 16	



**NOTES:**

1. SPLIT RANGE CONTROL. IF FAN IS OFF AND TC-133 STILL BELOW SET POINT, OPEN TV-133.
2. DRAINS REQUIRED AT ALL LOW POINTS AND VENTS REQUIRED AT ALL HIGH POINTS.

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TITLE <b>DFC4000 POWER PLANT PIPING &amp; INSTRUMENTATION DIAGRAM ANODE GAS COOLING LOOP</b>			
CAGE CODE <b>63131</b>	SIZE Location D ---	DWG NO <b>615S-31-02</b>	REV <b>8</b>
SCALE NONE		SHEET 14 OF 16	

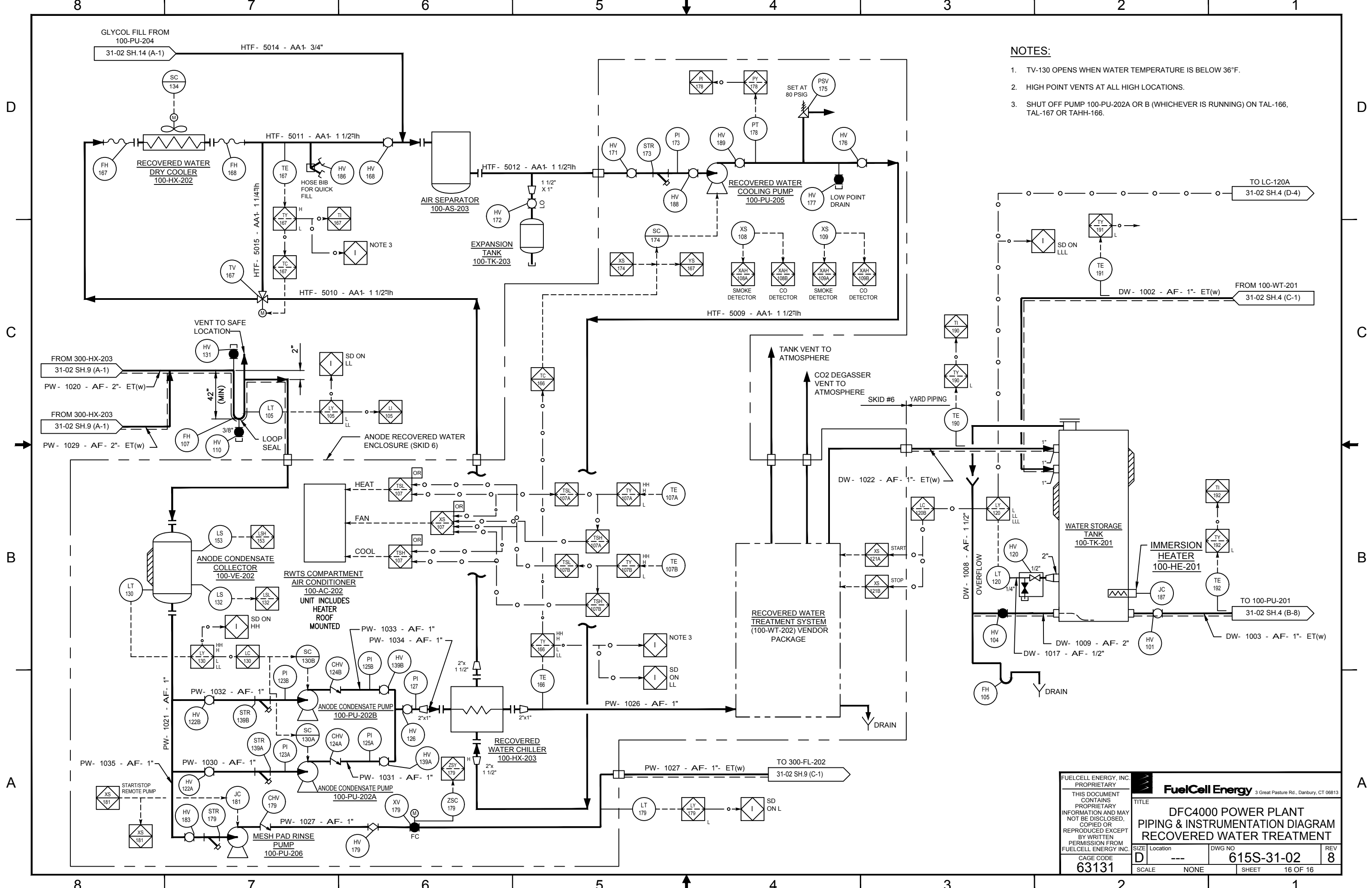


**NOTES:**

1. LOCATE HV-361 CLOSE TO WATER SEAL VESSEL BURIED IN INSULATION.
2. PRV-359 IS INTENDED TO PROTECT TOPPING MODULE ANODE MANIFOLDS FROM HIGH DIFFERENTIAL PRESSURE DURING TRANSIENTS CAUSED BY LOSS OF SITE POWER. PRV-359 IS NOT INTENDED OR REQUIRED FOR PERSONAL PROTECTION.
3. WEEP HOLE IS LOCATED AT LOW POINT AT PRV-359 DISCHARGE TO PREVENT CONDENSATE BUILD-UP.
4. MINIMUM 5 FEET OF UNINSULATED PIPE
5. TE-361 TO BE LOCATED AS CLOSE TO PRV-359 AS POSSIBLE.

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	<b>TITLE</b> DFC4000 POWER PLANT PIPING & INSTRUMENTATION DIAGRAM ANODE WATER SEAL		
	SIZE Location <b>D ---</b>	DWG NO <b>615S-31-02</b>	REV <b>8</b>
	SCALE NONE	SHEET 15 OF 16	





**NOTES:**

1. TV-130 OPENS WHEN WATER TEMPERATURE IS BELOW 36°F.
2. HIGH POINT VENTS AT ALL HIGH LOCATIONS.
3. SHUT OFF PUMP 100-PU-202A OR B (WHICHEVER IS RUNNING) ON TAL-166, TAL-167 OR TAHH-166.

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TITLE <b>DFC4000 POWER PLANT          PIPING &amp; INSTRUMENTATION DIAGRAM          RECOVERED WATER TREATMENT</b>			
CAGE CODE <b>63131</b>	SIZE Location D ---	DWG NO <b>615S-31-02</b>	REV <b>8</b>
SCALE NONE	SHEET 16 OF 16		