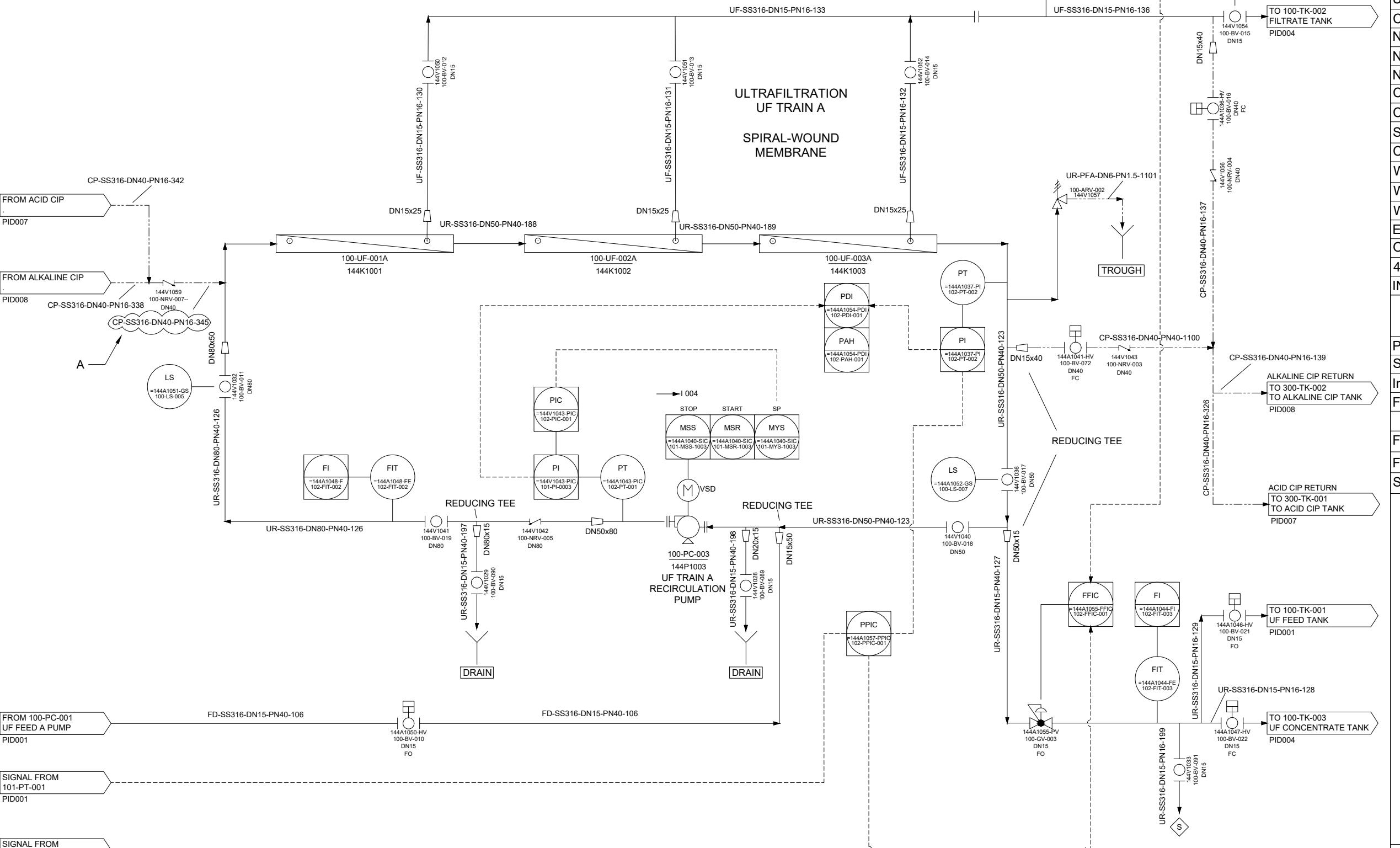




100-UF-001A	100-UF-002A	100-UF-003A	100-PC-003
UF TRAIN A	UF TRAIN A	UF TRAIN A	UF A RECIRCULATION PUMP
NO OF PV'S	1	NO OF PV'S	1
PRESSURE RATING	PN 60	PRESSURE RATING	PN 60
MEMBRANES PER PV	2	MEMBRANES PER PV	2
TYPE	SPIRAL	TYPE	SPIRAL
MOC	316 SS	MOC	316 SS
			CAPACITY 17.0 m³/h
			HEAD 22 m
			POWER 2.2 kW
			MOC 316 SS



## MATERIAL CODE

FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Deminerlized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

## LEGEND

Process Stream	—
Signal	- - -
Intermittent	— — —
Flexible line	wavy line
Fail Open	FO
Fail Closed	FC
Sample Valve	◊

A. RE-ADDED "CP-345"

Client

**ANDRITZ**  
**LigniQ**

PRESSURE RATIO CONTROLLER  
SIGNAL TO UF A FEED  
PUMP MOTOR SPEED  
CONTROL 100-PC-001

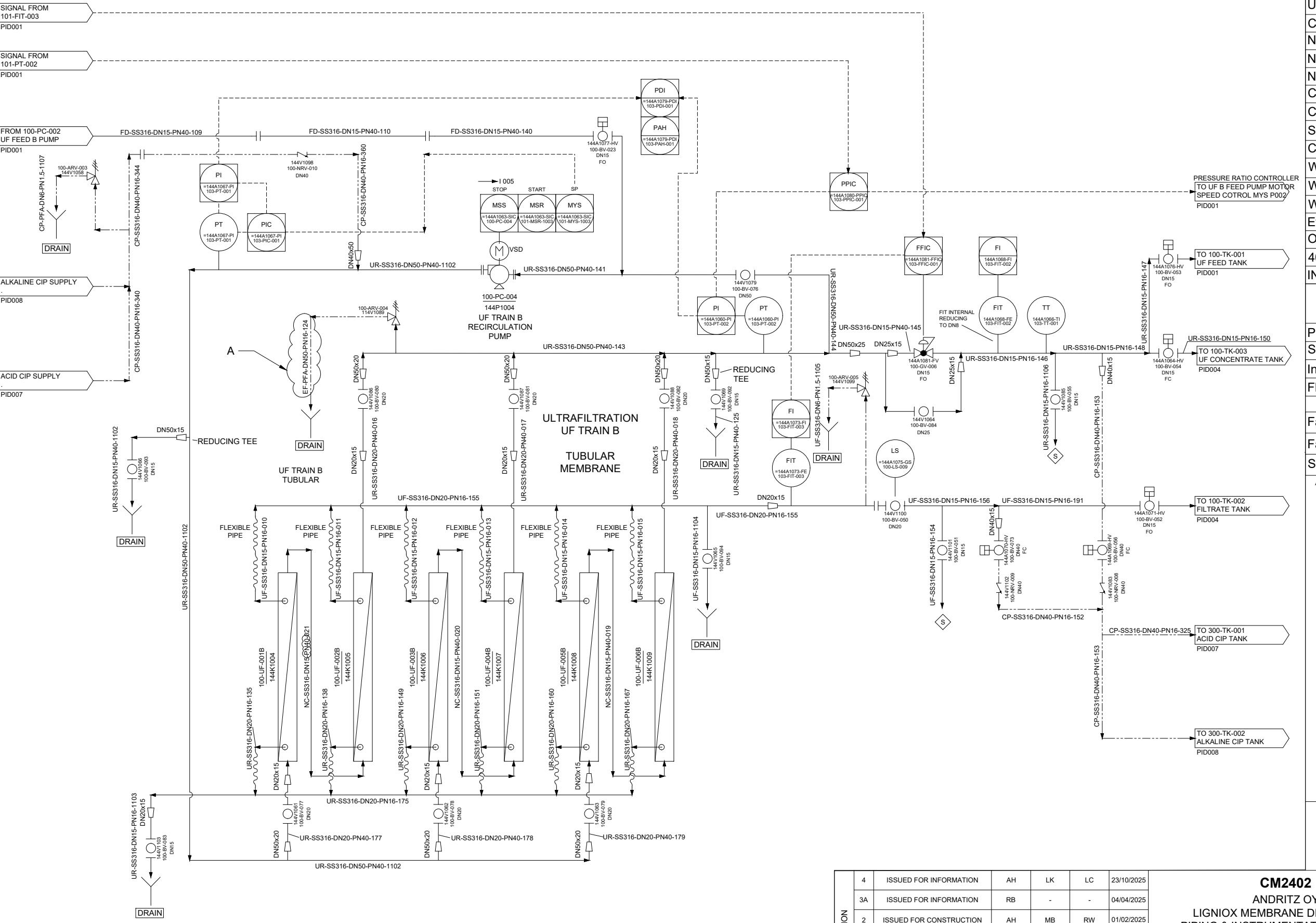
**CM2402**  
ANDRITZ OY  
LIGNIOX MEMBRANE DEMO PLANT  
PIPING & INSTRUMENTATION DIAGRAM  
AREA 100 - UF TRAIN A (SPIRAL)

This drawing is subject to return on demand and must not be copied or passed on to any third party or used directly or indirectly for any other purpose than the design and construction to the order of CHIMERICAL TECHNOLOGY (PTY) LTD.

**CHIMERICAL**  
**TECHNOLOGY**

DRAWING NO.: CM2402-AND001-4A-PID002  
PID NO.: PID002  
REV. 4

REVISION	ISSUED FOR INFORMATION					LC	23/10/2025
	4	AH	LK	RB	04/04/2025		
3A	ISSUED FOR INFORMATION	RB	-	-	04/04/2025		
2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025		
1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025		
0	ISSUED FOR INFORMATION	RB	SCV	DS	17/05/2024		
	REV.	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE	



## MATERIAL CODE

FLUID	CODE
igniOx Solution	LS
F Feed	FD
F Filtrate	UF
F Reject	UR
ombed Concentrate	CC
F Feed (High Pressure)	FN
F Concentrate	NC
F Permeate	NP
IP Supply	CS
IP Return	CP
ulfuric Acid	AS
austic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Demineralized)	WC
Water Potable	WP
ffluent	EF
ffgas Vapour	EV
0% SMBS	SM
NSTRUMENT AIR	IA

## LEGEND

process Stream	
signal	
intermittent	
flexible line	
ail Open	FO
ail Closed	FC
ample Valve	

#### A. MATERIAL CHANGE SS316 TO PFA

## Client



**CM2402**  
**ANDRITZ OY**

**LIGNIOX MEMBRANE DEMO PLANT**  
**PIPING & INSTRUMENTATION DIAGRAM**  
**AREA 100 - UF TRAIN B (TUBULAR)**



REVISION	4	ISSUED FOR INFORMATION	AH	LK	LC	23/10/2025	
	3A	ISSUED FOR INFORMATION	RB	-	-	04/04/2025	
	2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025	
	1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025	
	0	ISSUED FOR INFORMATION	RB	SCV	DS	17/05/2024	
	REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE	This is the

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001-4A

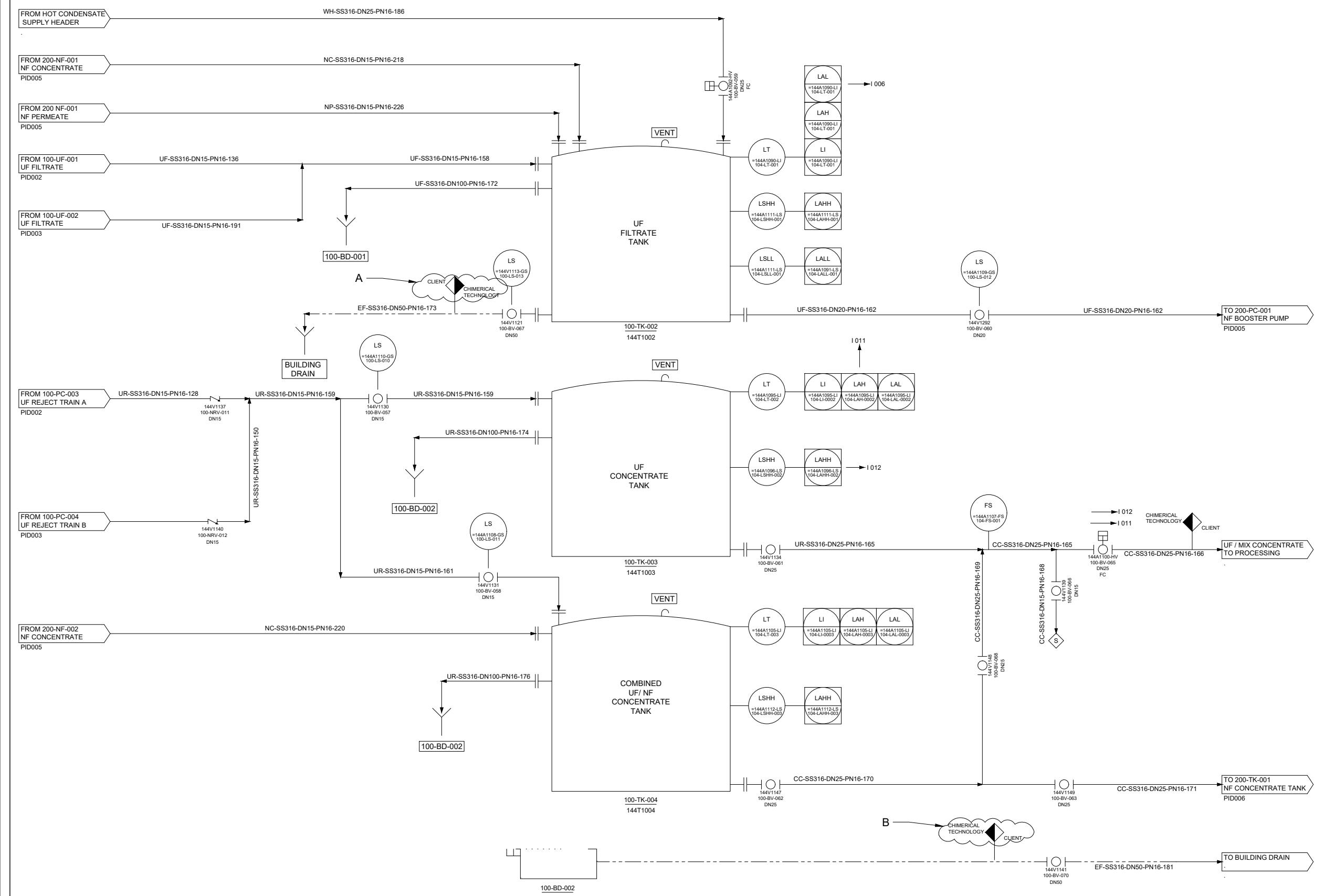
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ID003

PID NO  
PID003

4

100-TK-002		100-TK-003		100-TK-004	
UF FILTRATE TANK		UF CONCENTRATE TANK		UF COMB UF/INF CONCENTRATE TANK	
CAPACITY	1.96 m <sup>3</sup>	CAPACITY	1.1 m <sup>3</sup>	CAPACITY	1.1 m <sup>3</sup>
DIMENSION	Ø 1m H 2.5m	DIMENSION	Ø 1m H 1.5m	DIMENSION	Ø 1m H 1.5m
MOC	316 SS	MOC	316 SS	MOC	316 SS



## MATERIAL CODE

FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Demineralized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

## LEGEND

Process Stream	<hr/>
Signal	<hr/>
Intermittent	<hr/>
Flexible line	<hr/>
Fail Open	FO
Fail Closed	FC
Sample Valve	

- A. ADDED BATTERY LIMIT
- B. ADDED BATTERY LIMIT

For more information about the study, please contact Dr. Michael J. Hwang at (319) 356-4530 or via email at [mhwang@uiowa.edu](mailto:mhwang@uiowa.edu).

Client

**ANDRITZ**  
LigniQ

**CM2402**  
**ANDRITZ OY**  
**LIGNIOX MEMBRANE DEMO PLANT**  
**PIPING & INSTRUMENTATION DIAGRAM**  
**AREA 100 - UF TANKS**

REVISION	4	ISSUED FOR INFORMATION	AH	LK	LC	23/10/2025
	3A	ISSUED FOR INFORMATION	RB	-	-	04/04/2025
	2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025
	1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025
	0	ISSUED FOR INFORMATION	RB	SCV	DS	17/05/2024
	REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE

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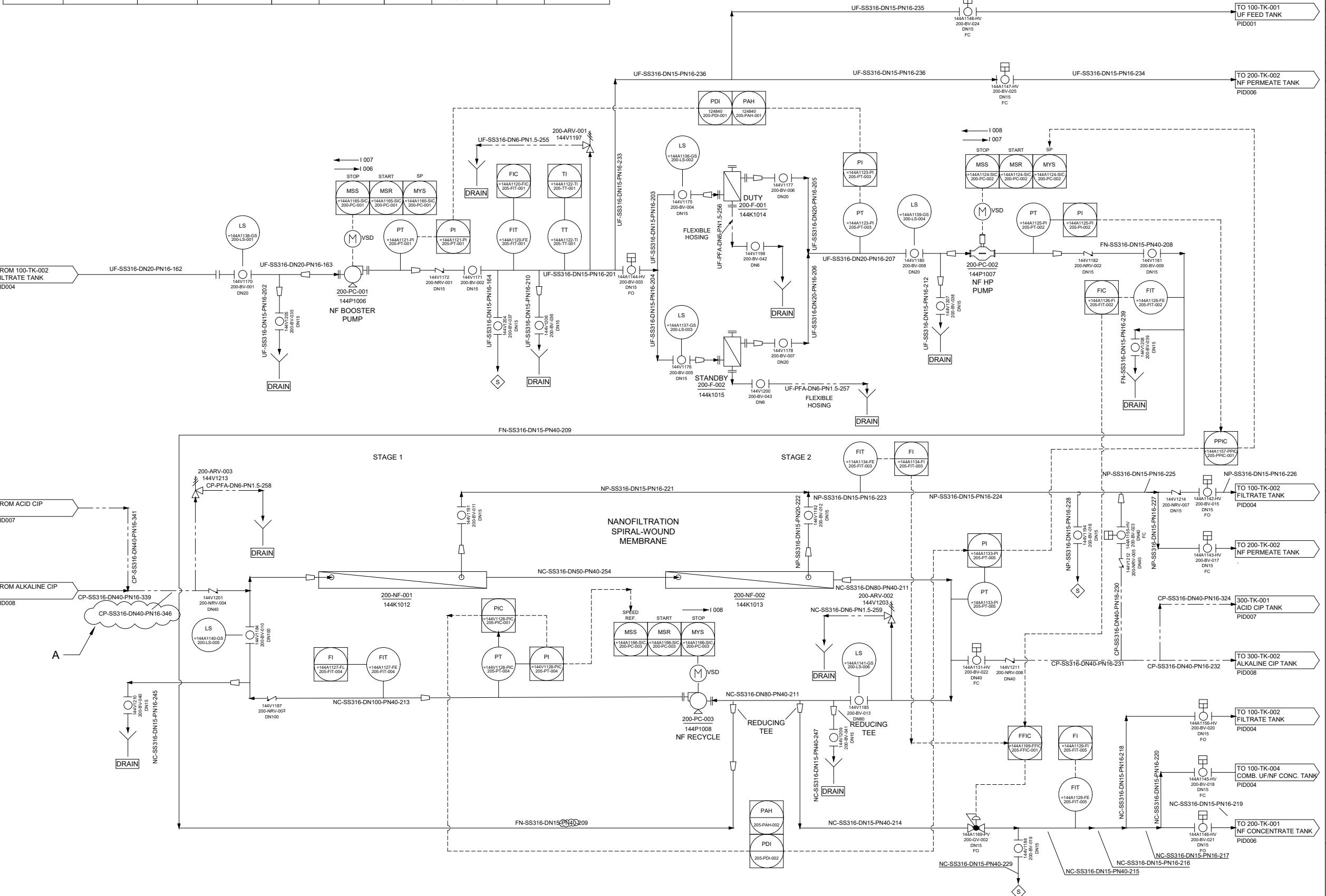




**CHIMERICAL  
TECHNOLOGY**

DRAWING NO.: CM2402-AND001-4A-PID004 PID NO.: PID004 REV. 4

200-F-001 / 2		200-NF-001 / 2		200-PC-001		200-PC-002		200-PC-003	
NF FEED CARTRIDGE FILTERS		NF TRAIN		NF BOOSTER PUMP		NF HP PUMP		NF RECYCLE PUMP	
CAPACITY	1.2 m³/h	NO OF PV'S	2	CAPACITY	1.8m³/h	CAPACITY	1.80 m³/h	CAPACITY	43m³/h
MIN PARTICLE SIZE	1 µm	PRESSURE RATING	69 Bar	HEAD	38.6m	HEAD	172m	HEAD	3 Bar
DIFFERENTIAL PRESSURE	2 Bar	MEMBRANES PER PV	1	POWER	0.55 kW	POWER	2.2kW	POWER	4kW
MOC	316 SS	TYPE	Spiral	MOC	316 SS	MOC	316 SS	MOC	316 SS



## MATERIAL CODE

FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Demineralized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

## LEGEND

Process Stream	<hr/>
Signal	<hr/>
Intermittent	<hr/>
Flexible line	
Fail Open	FO
Fail Closed	FC
Sample Valve	

#### A. CHANGED CS TO CR

Client

**ANDRITZ**  
**Ligni Q**

CM2402

ANDRITZ OY  
LIGNOX MEMBRANE DEMO PLANT  
PIPING & INSTRUMENTATION DIAGRAM  
AREA 200 - NF

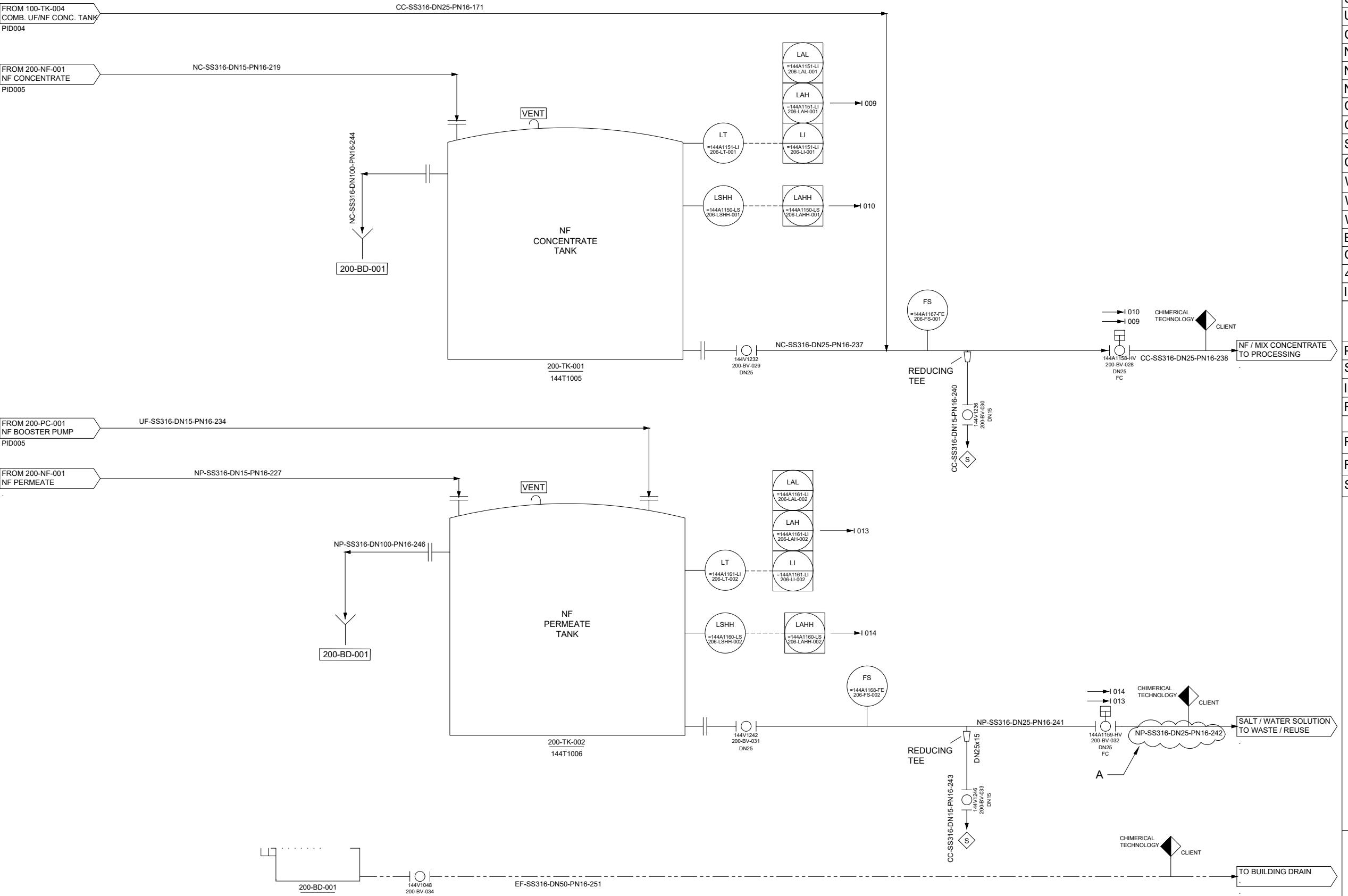
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	2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025
	1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025
	0	ISSUED FOR INFORMATION	RB	SCV	DS	17/05/2024
	REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE

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DRAWING NO.: CM2402-AND001-4A-PID005 PID NO.: PID005 REV. 4

200-TK-001	200-TK-002
NF CONCENTRATE TANK	NF PERMEATE TANK
CAPACITY	1.1 m³
DIMENSIONS	Ø 1m H 2.5m
MOC	316 SS
MOC	316 SS



300-FB-001	300-DP-001	300-PC-001	300-TK-001				
BAG FILTER		DOSING PUMP		ACID CIP PUMP		ACID CIP TANK	
CAPACITY	17m³/h	CAPACITY	0.07m³/h	CAPACITY	17m³/h	CAPACITY	1.01m³
MIN PARTICLE SIZE	1 um	HEAD	10 m	HEAD	30m	DIMS	Ø 0.89m H 1.16m
DIFFERENTIAL PRESSURE	2 bar	POWER	0.062 kW	POWER	3 kW	MOC	316 SS
MOC	316 SS	MOC	316 SS	MOC	316 SS	MOC	316 SS

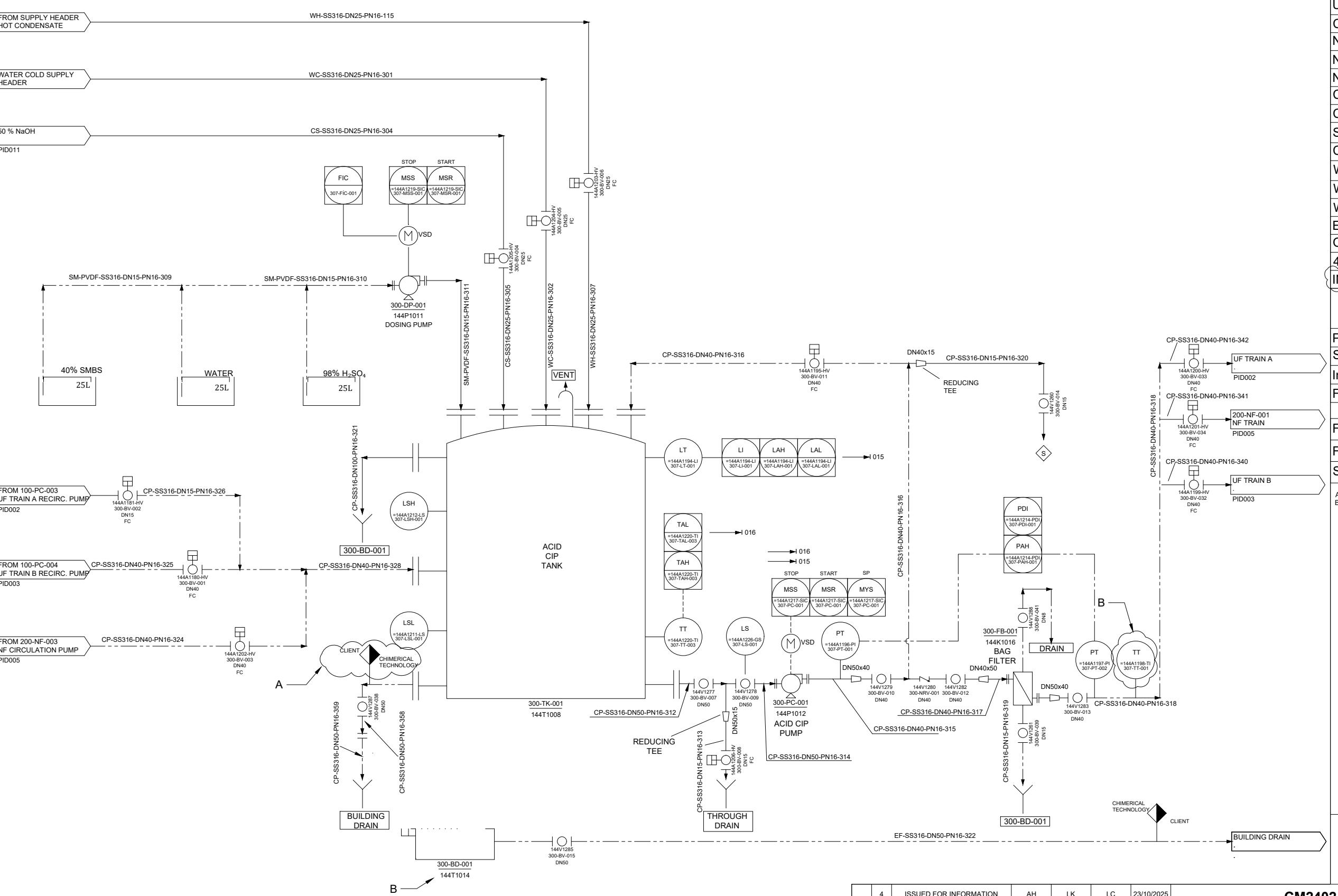
## MATERIAL CODE

FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Deminerlized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

## LEGEND

Process Stream	———
Signal	- - -
Intermittent	— — —
Flexible line	~~~~~
Fail Open	FO
Fail Closed	FC
Sample Valve	◇

A. ADDED BATTERY LIMIT  
B. CHANGED TAG



REVISION	CM2402						
	4	ISSUED FOR INFORMATION	AH	LK	LC	23/10/2025	
3A	ISSUED FOR INFORMATION	RB	-	-	-	7/04/2025	
2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025		
1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025		
0	ISSUED FOR INFORMATION	RB	SCV	DS	17/05/2024		
	REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE	

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DRAWING NO.: CM2402-AND001-4A-PID007  
PID NO.: PID007  
REV. 4

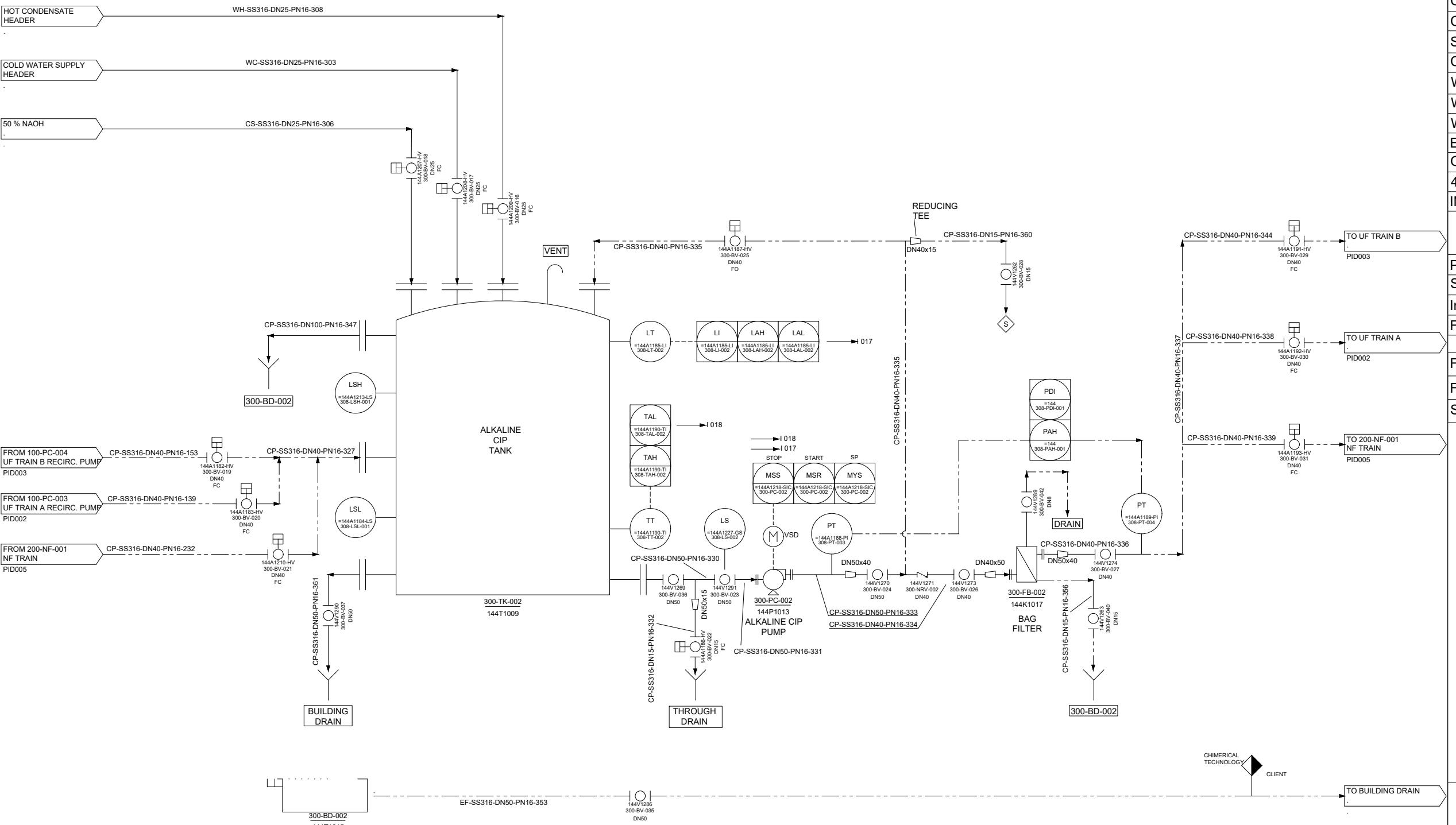
300-FB-002	300-PC-001	300-TK-002	
BAG FILTER		ALKALINE CIP PUMP	ALKALINE CIP TANK
CAPACITY	17 m³/h	CAPACITY	17 m³/h
MIN PARTICLE SIZE	1 µm	HEAD	30m
DIFFERENTIAL PRESSURE	2 bar	POWER	3 kW
MOC	316 SS	MOC	316 SS

## MATERIAL CODE

FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Deminerlized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

## LEGEND

Process Stream	—
Signal	- - -
Intermittent	- - - -
Flexible line	~~~~~
Fail Open	FO
Fail Closed	FC
Sample Valve	◆

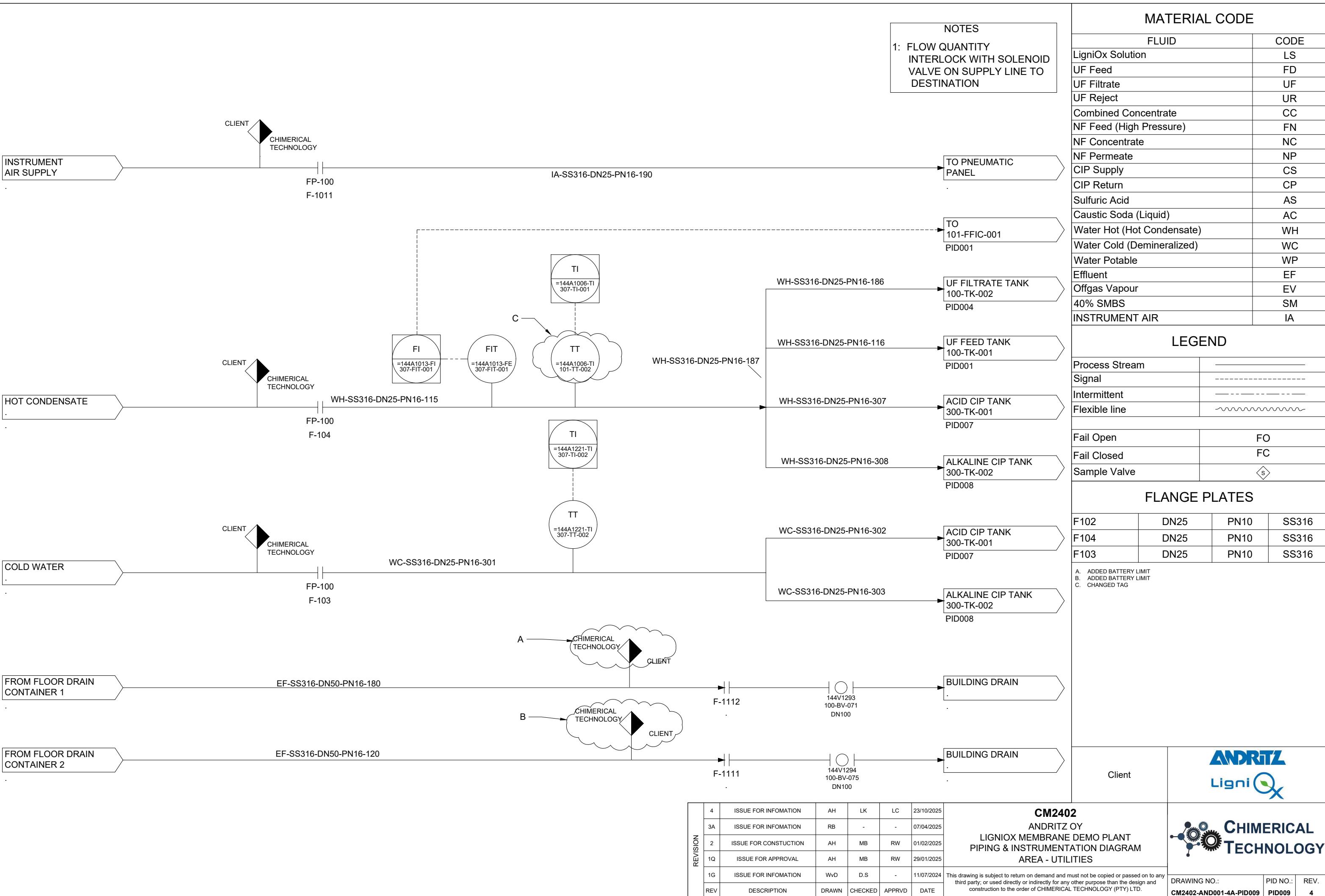


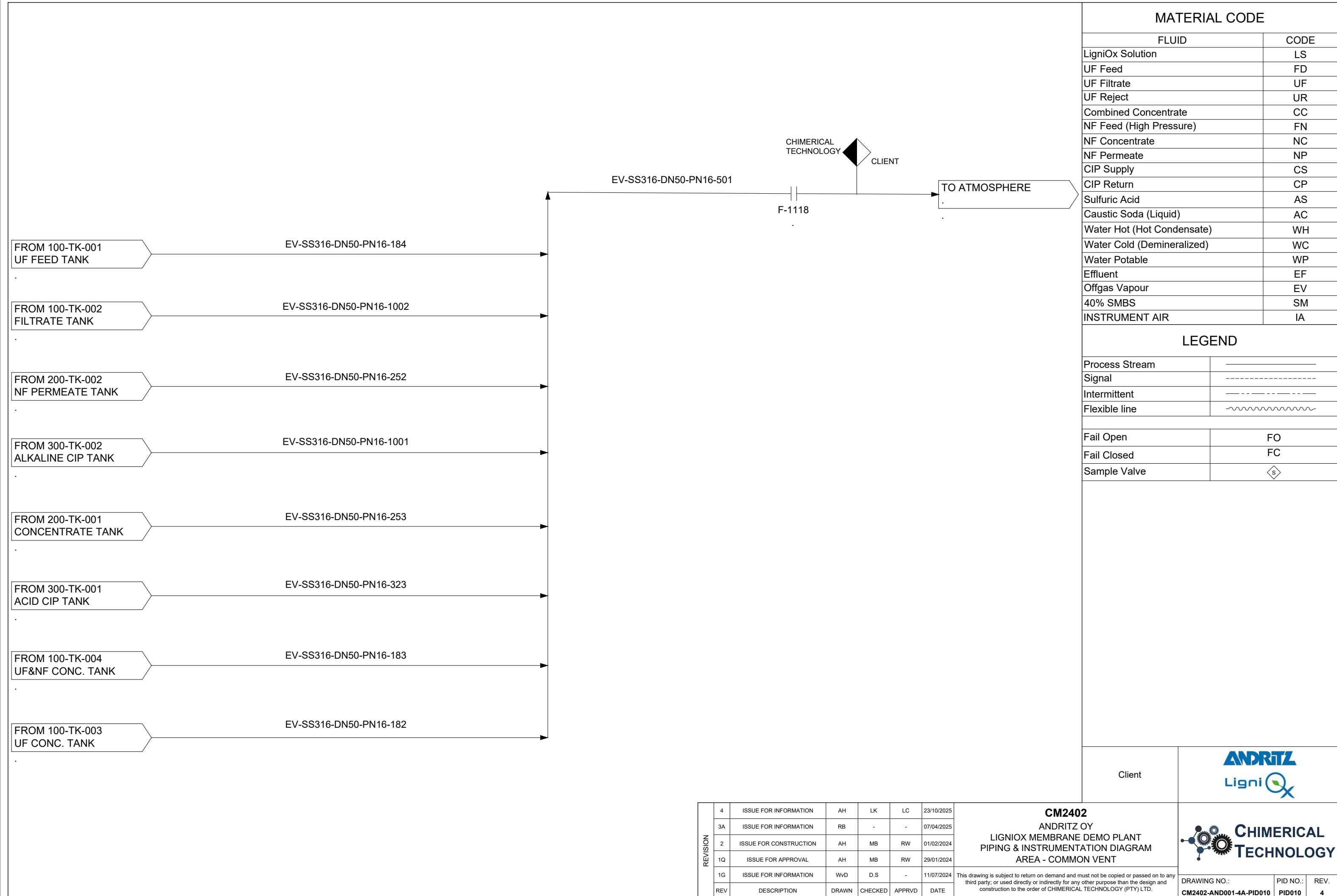
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	3A	ISSUED FOR INFORMATION	RB	-	-	07/04/2025	
2	ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025		
1Q	ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025		
1A	ISSUED FOR INFORMATION	RB	-	-	13/06/2024		
REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE	This drawing is subject to return on demand and must not be copied or passed on to any third party or used directly or indirectly for any other purpose than the design and construction to the order of CHIMERICAL TECHNOLOGY (PTY) LTD.	
DRAWING NO.:	CM2402-AND001-4A-PID008	PID NO.:	PID008	REV.	4		

**ANDRITZ**  
**LigniOx**



Client





### MATERIAL CODE

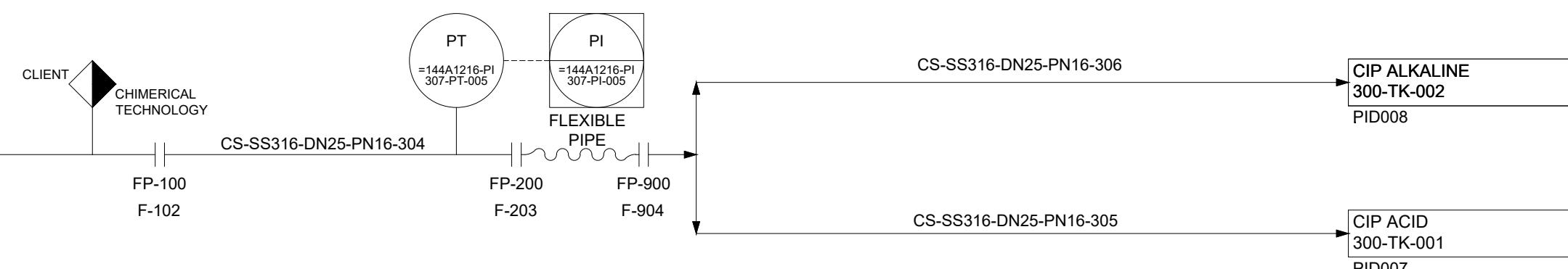
FLUID	CODE
LigniOx Solution	LS
UF Feed	FD
UF Filtrate	UF
UF Reject	UR
Combined Concentrate	CC
NF Feed (High Pressure)	FN
NF Concentrate	NC
NF Permeate	NP
CIP Supply	CS
CIP Return	CP
Sulfuric Acid	AS
Caustic Soda (Liquid)	AC
Water Hot (Hot Condensate)	WH
Water Cold (Demineralized)	WC
Water Potable	WP
Effluent	EF
Offgas Vapour	EV
40% SMBS	SM
INSTRUMENT AIR	IA

### LEGEND

Process Stream	—
Signal	—
Intermittent	—
Flexible line	~~~~~
Fail Open	FO
Fail Closed	FC
Sample Valve	◇

### FLANGE PLATES

F102	DN25	PN10	SS316
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Client

**ANDRITZ**  
**LigniQ**

**CHIMERICAL**  
**TECHNOLOGY**

REVISION	REV	CM2402						This drawing is subject to return on demand and must not be copied or passed on to any third party or used directly or indirectly for any other purpose than the design and construction to the order of CHIMERICAL TECHNOLOGY (PTY) LTD.
		4	ISSUED FOR APPROVAL	AH	LK	LC	23/10/2025	
3A		ISSUED FOR APPROVAL	RB	-	-	07/04/2025		
2		ISSUED FOR CONSTRUCTION	AH	MB	RW	01/02/2025		
1Q		ISSUED FOR APPROVAL	AH	MB	RW	29/01/2025		
	REV	DESCRIPTION	DRAWN	CHECKED	APPRVD	DATE		

DRAWING NO.: CM2402-AND001-4A-PID011  
PID NO.: PID011  
REV. 4