



**AUTOMATED PROCESS SOLUTIONS**

# Designed. Engineered. Manufactured. **Supported.**

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At REL, our approach to designing, building, and installing automated metal etch processing lines, chemical cleaning processing lines, and non-destructive testing equipment for fluorescent penetrant and magnetic particle inspection has been built on decades of experience solving complex technical challenges for our customers. REL ideates and manufactures world class, Industry 4.0, reliable, and exactly controlled equipment.

**Visit [relinc.com](http://relinc.com) to view all of REL's products.**

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# METAL ETCH

Complex challenges. Convenient Controlled Solutions.

## Exact Metal Etch Equipment

Effective cleaning and surface etch preparation is a critical step in the quality control of precision parts for all part manufacturers, especially those providing parts to aerospace and outer space vehicles. At REL, our approach to designing, building, and installing automated metal etch and chemical cleaning processing lines has been built on decades of experience solving complex technical challenges for our customers to create scientifically sound, industry certified, high throughput, reliable, and long-lasting equipment.

REL automated Metal Etching lines allow for effective surface removal before Non-Destructive Evaluation of your Safety Critical Components. Removing exact material thickness to expose subsurface material structure allows for subsequent material integrity evaluation or surface preparation for the next coating operation. Utilize your current chemical supplier and REL equipment. Design and implement processing recipes with real time etch rate control, and automated chemical dosing, and log all processing data with our dynamic motion control and infinite processing memory.

REL automated Chemical Cleaning lines allow for effective surface cleaning prep before Non-Destructive Testing of your Safety Critical Components. Remove surface coatings and tarnishes utilizing your chosen chemical supplier and REL equipment. Design and implement processing recipes 'on the fly', and log all processing data with our dynamic motion control and infinite processing memory.



# AUTOMATED METAL ETCH LINES

## We ‘cut our teeth’ on material removal.

Material removal via chemical reaction is Metal Etching. How else can you remove precisely 0.0002” of material over the equivalent surface area of a football field on a part with complex geometry? This process is utilized for surface material removal and/or surface prep for a plethora of aerospace and rocket parts. As a manufacturer of automated processing metal etch equipment, we maximize our metallurgical and chemical understanding of materials that make up things that move in the world. Our automated systems use a range of overhead conveyance methods and precision carriers, to move multiple parts with complex geometries and varying weights carefully and smoothly through the stages of your specific process requirements.

Our equipment has real time control to meet exact etching requirements. Etch rates can be predicted and learned on the control to increase throughput without guessing, and checking to verify surface material removal.

Our Automated Metal Etch and Chemical Processing Systems are run on our comprehensive Control Systems platform. Each automated line is controlled and monitored using a historian database that can be configured to exacting specifications. The intuitive user interface (UI) stores recipes which can be selected and applied to individual baskets. Random loading high throughput lines are our standard and our specialty. Coho Control, the breakthrough software Industry 4.0 component of our control system platform, provides real time data enabling real time database queries, rapid trouble shooting, in depth analytics, and compliance reporting.



1. Chemical processing tank with eductor agitation
2. Process visibility with REL process control
3. Anodized parts from an REL automated anodizing process
4. Integrated safety in process control

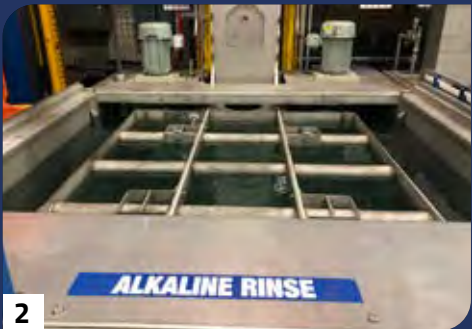


# AUTOMATED CLEANING LINES

## Cleanliness. Demanded.

Cleaning and surface preparation are a critical step in the quality control of precision parts for all part manufacturers, especially those providing parts to aerospace and outer space vehicles. At REL, our approach to designing, building, and installing automated precision Chemical Cleaning lines has been built on decades of experience in solving complex technical challenges for our customers.

Our automated systems use a range of overhead conveyance methods and precision basket carriers to move multiple parts with complex geometries and varying weights carefully and smoothly through the stages of your specific cleaning process requirements. We excel in working with all stakeholders in the process including chemical suppliers, wastewater treatment suppliers, factory secondary/tertiary containment, backup power integration and air quality requirements to keep your employees and everyone's environment safe.



1. Servo index setup screen for the automated system transporter
2. Integrated stainless steel lowerator in a cleaning process
3. View of air ventilation, plumbing and electrical packaging on a cleaning system
4. Motor control components and protection for run monitoring and service



## Features and Benefits

- High throughput random loading
- Web based UI for maximum process visibility and safety
- State-based recovery from industrial grade on-site server
- Designed specially to integrate with Allen Bradley PLC's
- On-the-fly tank configurations
- Real-time Automated Tank Filling with adjustable chemical concentrations
- Infinite process recipe flexibility with the ability to move multi-directionally through processing
- Dynamic Tank Control - Individual tanks can be 'Blocked' (from processing parts) or 'Disabled' (taken out of service) during processing







# AUTOMATED FLUORESCENT PENETRANT INSPECTION

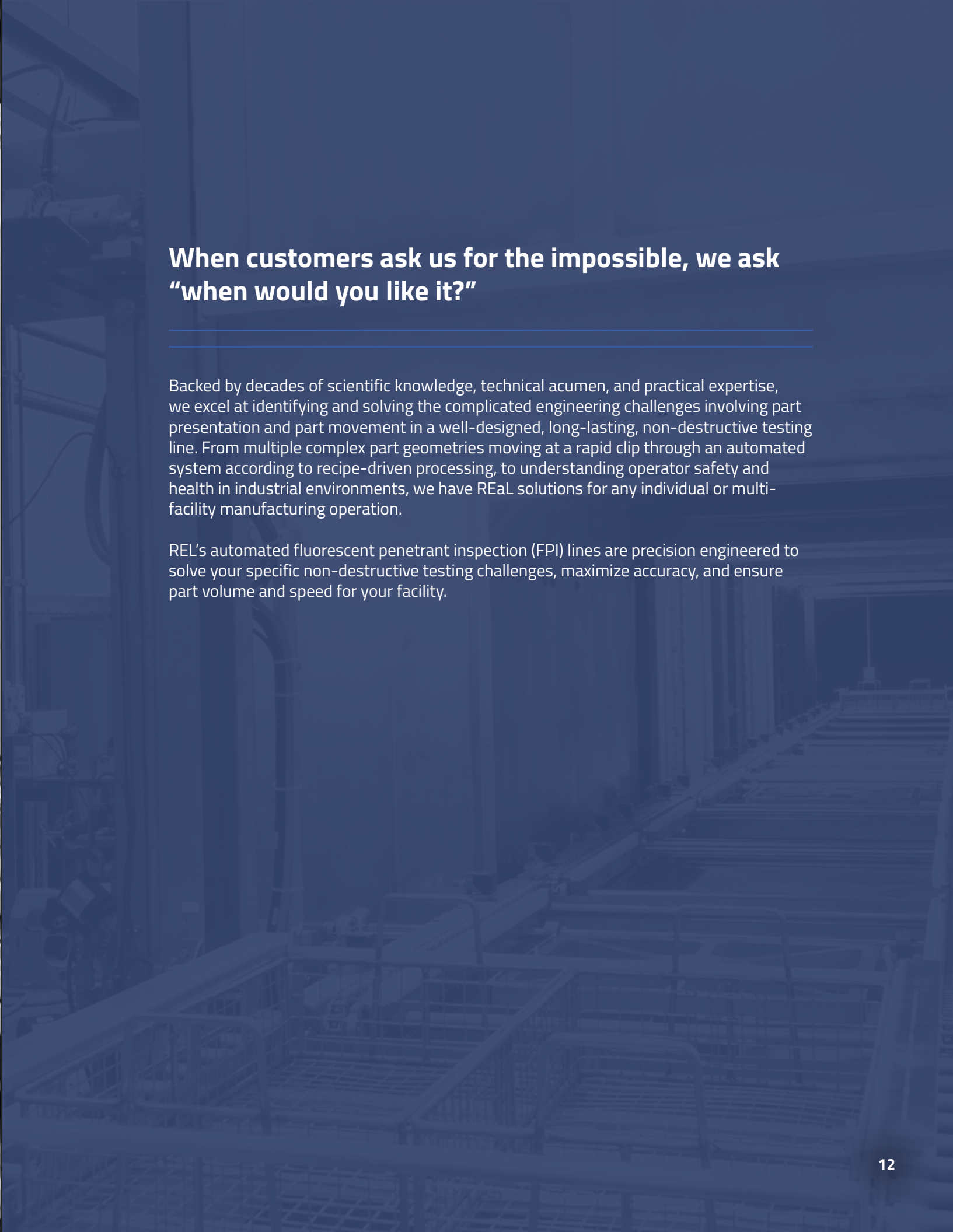
At REL, we design, manufacture, and install custom non-destructive testing equipment for fluorescent penetrant and magnetic particle inspection.

**When customers ask us for the impossible, we ask  
“when would you like it?”**

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Backed by decades of scientific knowledge, technical acumen, and practical expertise, we excel at identifying and solving the complicated engineering challenges involving part presentation and part movement in a well-designed, long-lasting, non-destructive testing line. From multiple complex part geometries moving at a rapid clip through an automated system according to recipe-driven processing, to understanding operator safety and health in industrial environments, we have REaL solutions for any individual or multi-facility manufacturing operation.

REL’s automated fluorescent penetrant inspection (FPI) lines are precision engineered to solve your specific non-destructive testing challenges, maximize accuracy, and ensure part volume and speed for your facility.





# AUTOMATED FLUORESCENT PENETRANT INSPECTION LINES



## We provide premium automated non-destructive testing lines.

REL automated fluorescent penetrant inspection (FPI) lines feature innovative process methods designed to increase our customer's productivity and throughput within their facilities. We design, manufacture, and install automated NDT Processing lines that are designed to handle specific complex part geometry. We specialize in the application of penetrant electrostatically. Why not save 80% of the penetrant cost compared to dip processing? Utilizing process water more than once for pre-rinsing also saves effluent that must be discharged or treated. These techniques along with REL's expertise in building fixtures minimizes Level III skepticism associated with safety critical components that are automatically processed.

REL's systems are designed to allow for safe operator intervention throughout the process for verification and required process check-offs during the process. If the plant loses power, there is no panic in the NDT department, because REL equipment has STATE Based recovery akin to desktop computers. This recovery allows for the system to pick up processing right where it left off before the power outage. The system standard UPS will keep the industrial grade server and the PLC under power for 24 hours to ensure no data is lost!



1. Electrostatic penetrant application
2. 16' L x 10' W x 10' H large part dryer
3. Line material handling individually driven chain conveyors to avoid process cross contamination
4. System carrier with integrated part baskets for small part processing



## REL is the premium brand in the world marketplace for automated FPI processing lines.

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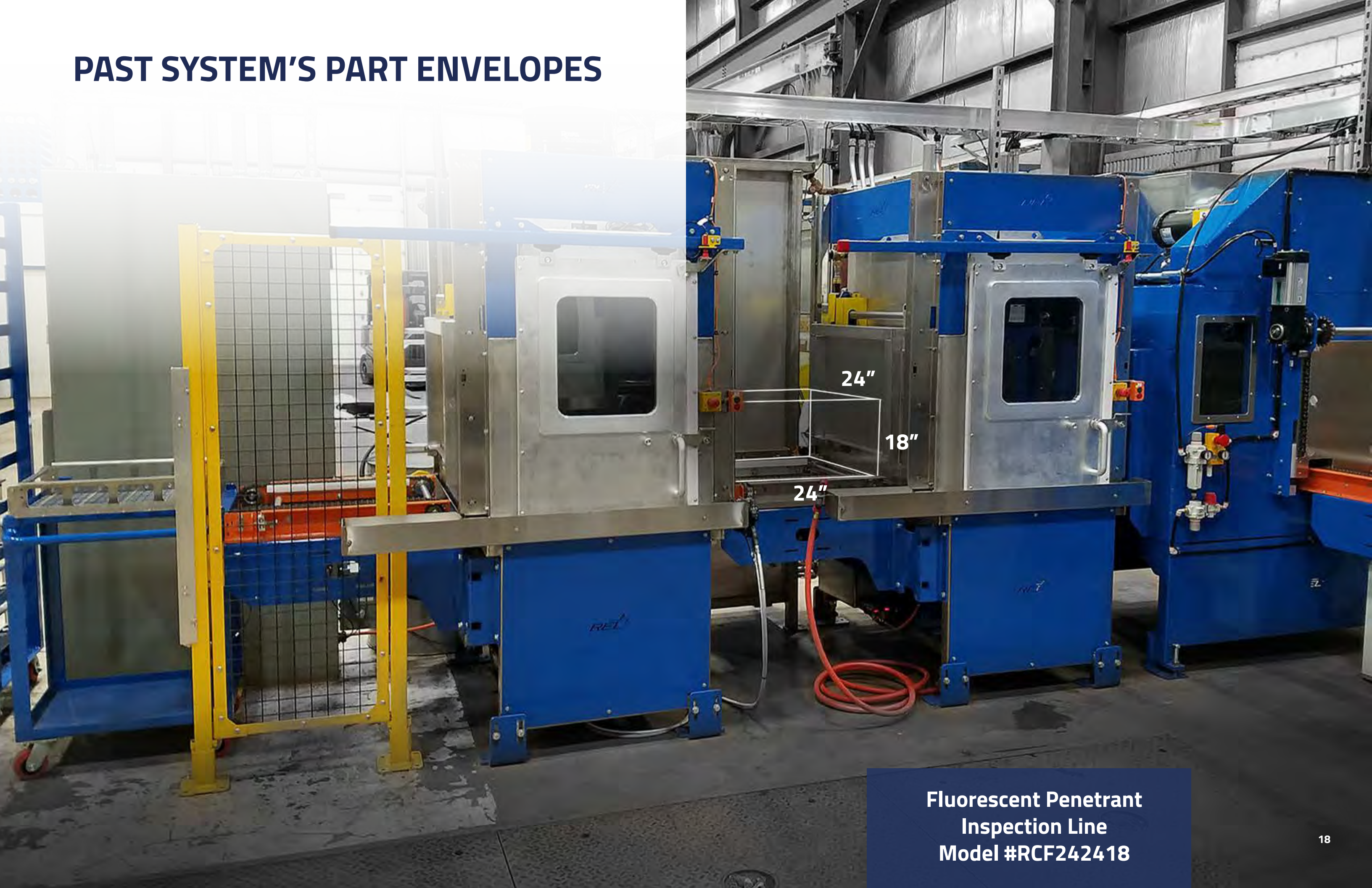
All systems are assembled at REL and factory acceptance testing (FAT) is performed with the customer witnessing the performance to ensure the equipment performs satisfactorily. With decades of NDT experience and a highly trained team, we're able to minimize your downtime by quickly and effectively installing your new REL line.

The only thing better than purchasing an REL Automated NDT system is the service and support that comes with it after installation.





# PAST SYSTEM'S PART ENVELOPES



Fluorescent Penetrant  
Inspection Line  
Model #RCF242418





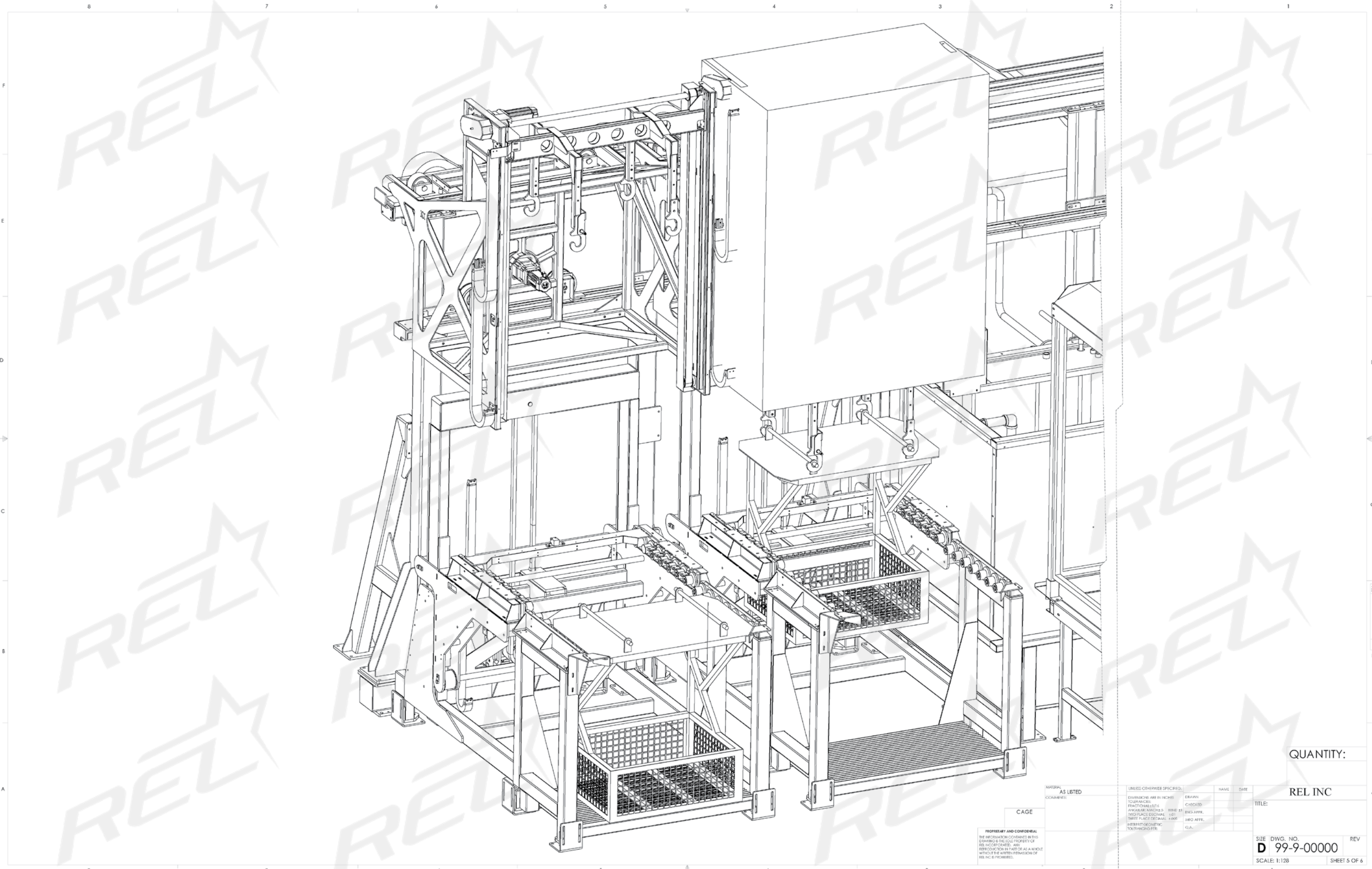
44"

44"

30"

Cleaning and FPI System  
Model #CLFPI304444





UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DRAWN			
CHECKED			
ENG APPR.			
MG APPR.			
G.A.			

AS LISTED	
EXAMINED	

TITLE:	
REL INC	

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CAGE

QUANTITY:

SIZE DWG. NO.  
**D 99-9-00000** REV

SCALE: 1:128 SHEET 5 OF 6





22"

36"

30"

**Fluorescent Penetrant  
Inspection Line  
Model #MLF303622**





**Fluorescent Penetrant  
Inspection Line  
Model #MLF303622**





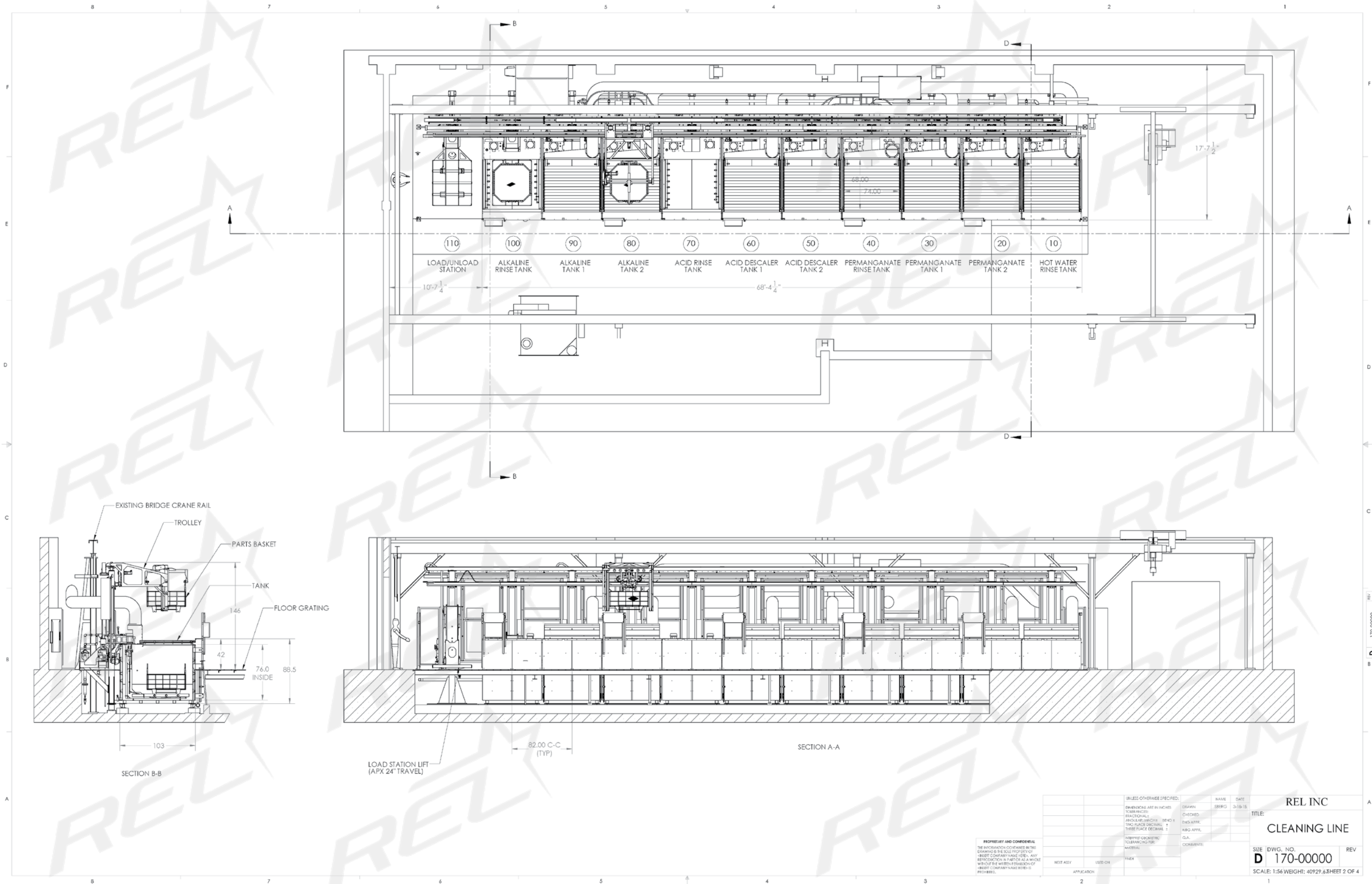
50"

48"

38"

**Cleaning Line  
Model #CL504838**





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UNLESS OTHERWISE SPECIFIED:		NAME	DATE
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FRACTIONALS	CHECKED		
DECIMALS	END APPR.		
TWO PLACE DECIMAL	KRG APPR.		
THREE PLACE DECIMAL	CLA		
INTERPRET GEOMETRIC	COMMENTS		
TOLERANCING PER			
MATERIAL			
FINISH			
APPLICATION			

REL INC		DATE	3-19-15
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REV			

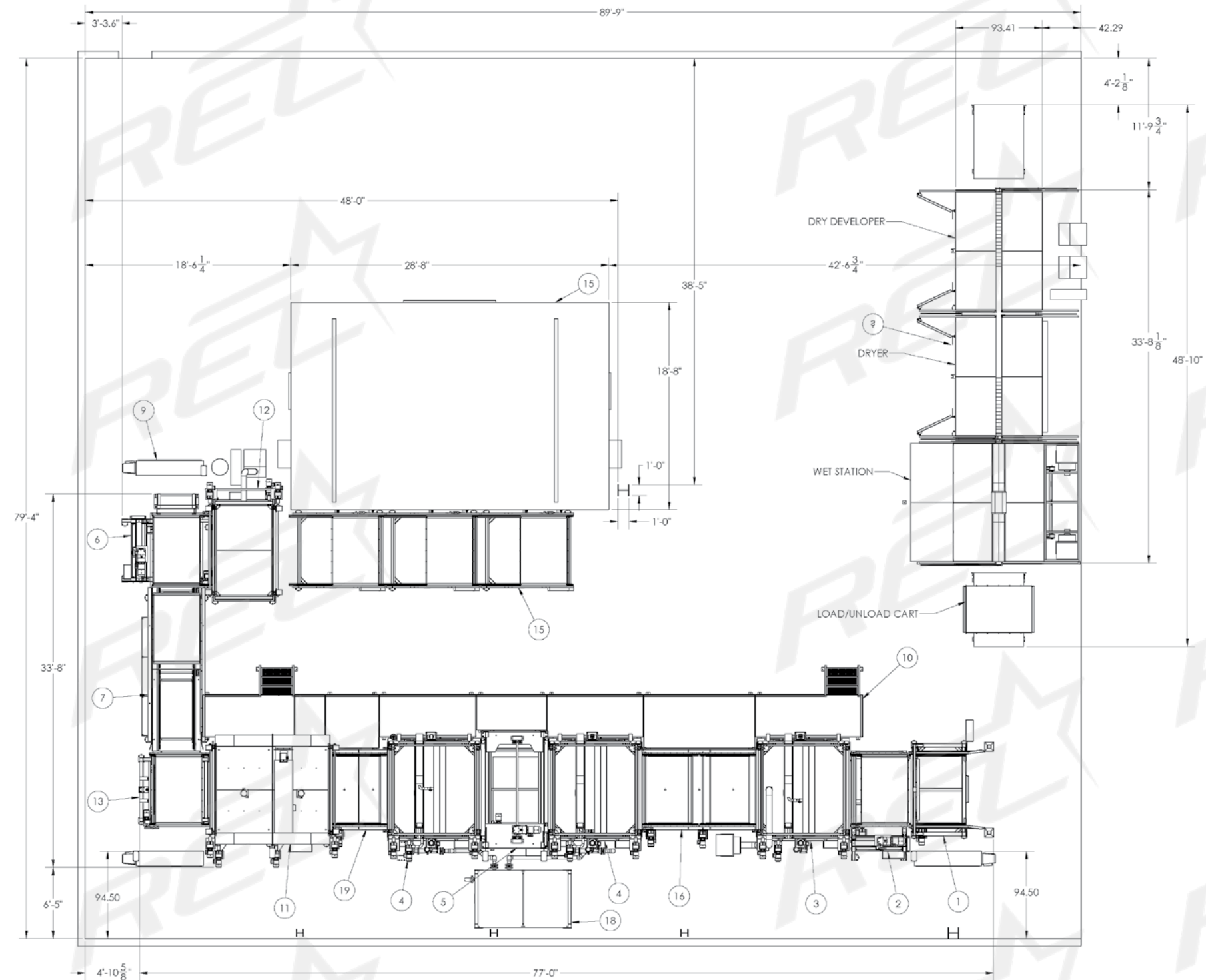




**Fluorescent Penetrant  
Inspection Line  
Model #RBF487242**



ITEM NO.	DESCRIPTION	Default/ Qty.
1	LOAD STATION	1
2	LIFT STATION	1
3	PENETRANT STATION	1
4	RINSE STATION	2
5	EMULSIFIER DIP STATION	1
F 6	LOWRATOR CORNER TRANSFER	1
7	STRAIGHT CONVEYOR	1
9	ELECTRICAL PANEL	3
10	CATWALK	1
11	DRYER	1
12	DRY DEVELOPER	1
13	CORNER TRANSFER	1
14	MANUAL FPI LINE	1
15		1
16	DOUBLE DWELL STATION	1
17		1
18	FRESH WATER TANK	1
E 19	SINGLE DWELL STATION	1



QUANTITY: 1

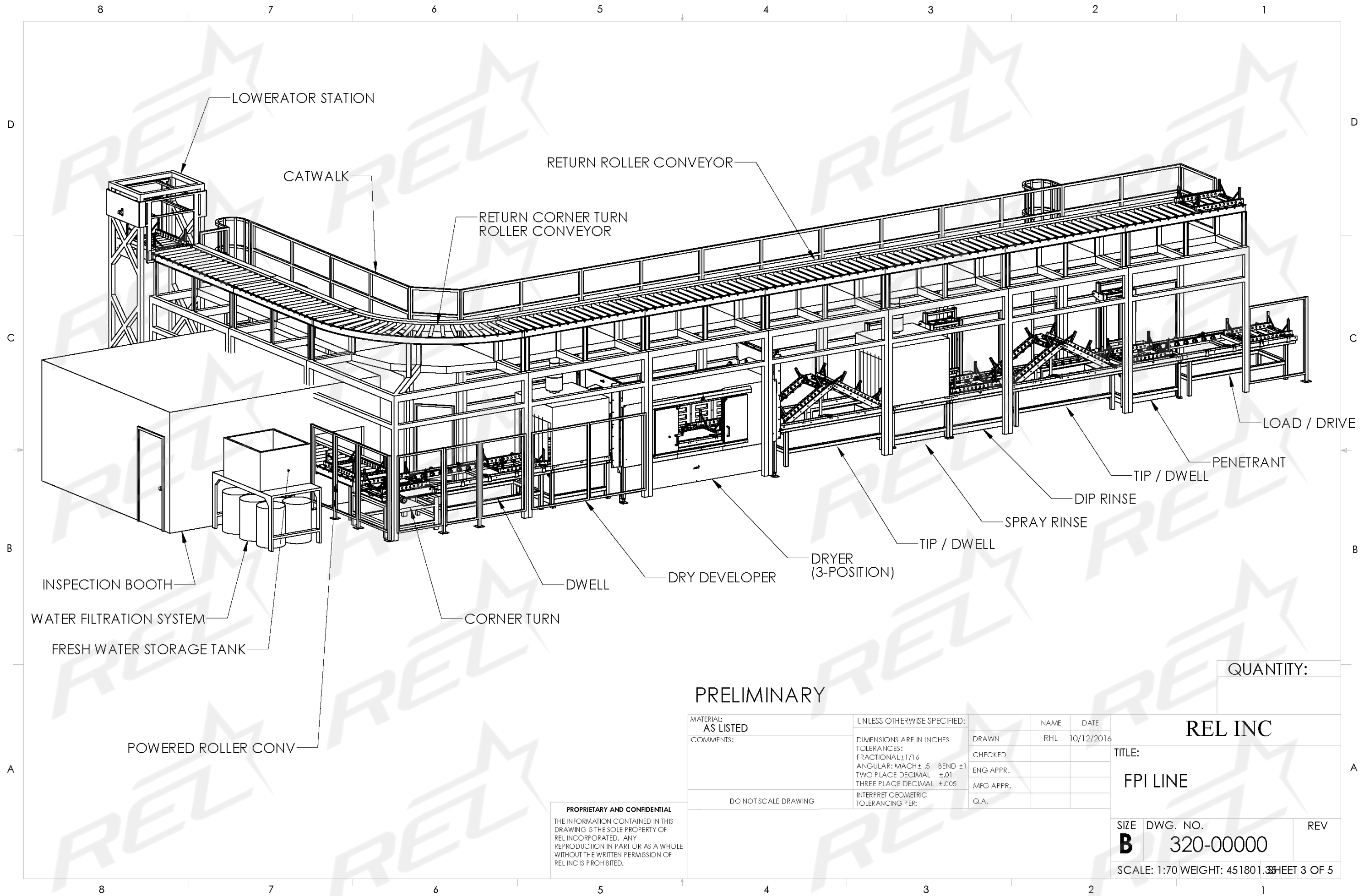
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		INTERF. GEOMETRIC TOLERANCING (I) UNIFORM				SIZE DWG. NO. <b>D</b> 130-00000		REV	
		THEIR				SCALE: 1:64 WEIGHT:		SHEET 1 OF 4	
NEXT ASSY		USED ON							
APPLICATION									
2						1			





**Fluorescent Penetrant  
Inspection Line  
Model #SAF472819**





PRELIMINARY

MATERIAL: AS LISTED		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	REL INC	
COMMENTS:		DIMENSIONS ARE IN INCHES		DRAWN	RHL 10/12/2016	TITLE:	
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		FRACTIONAL: $\pm 1/16$		ENG APPR.		SIZE DWG. NO.	
		ANGULAR: MACH $\pm .5$ BEND $\pm 1$		MFG APPR.		B 320-00000	
		TWO PLACE DECIMAL $\pm .01$		Q.A.		REV	
		THREE PLACE DECIMAL $\pm .005$				SCALE: 1:70 WEIGHT: 451801.38 SHEET 3 OF 5	
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DO NOT SCALE DRAWING							

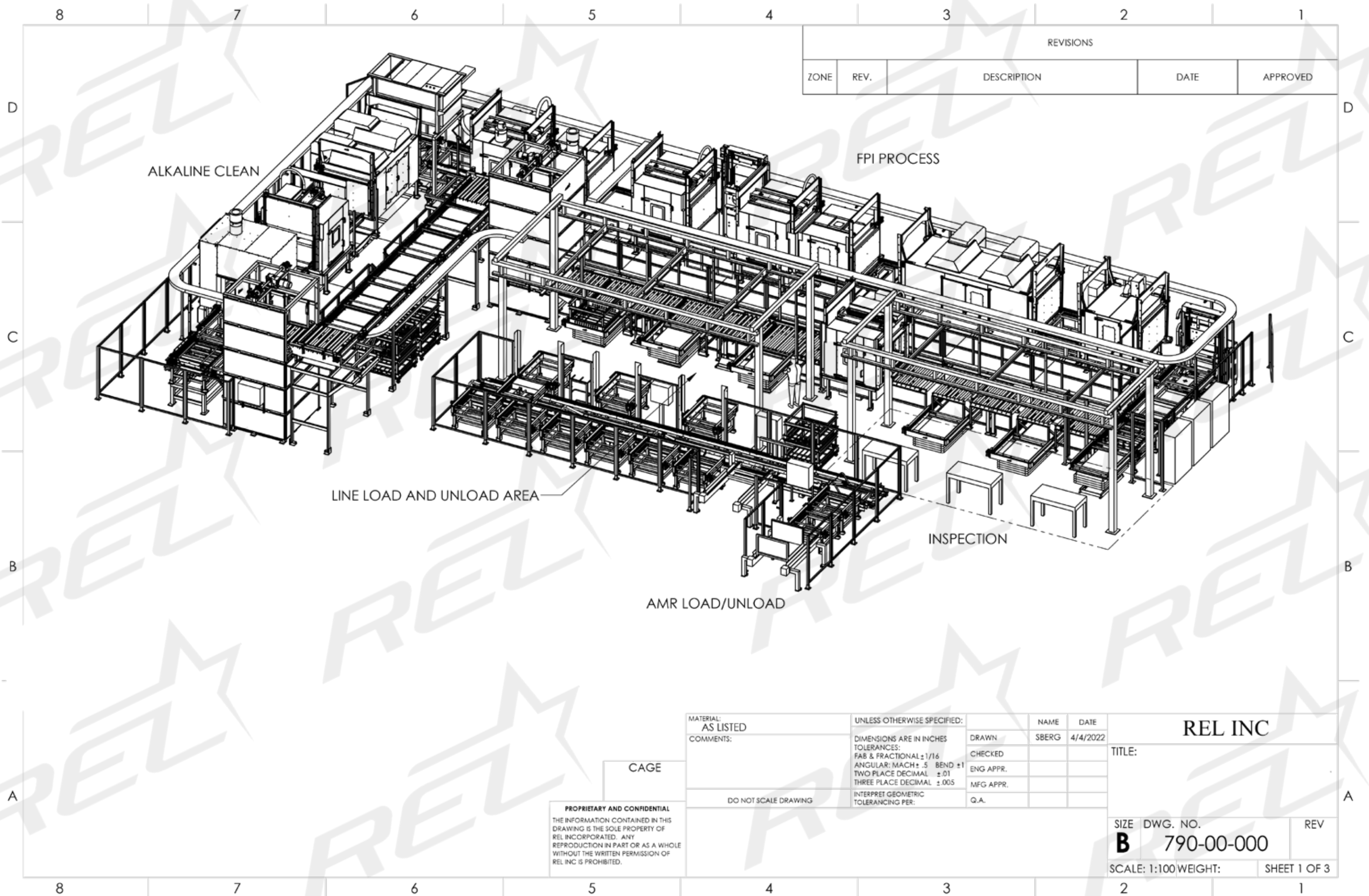
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**Cleaning and FPI System  
Model #CLFPI484832**





REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED

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MATERIAL:  
AS LISTED  
COMMENTS:

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FAB & FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm .5$  BEND  $\pm 1$   
TWO PLACE DECIMAL  $\pm .01$   
THREE PLACE DECIMAL  $\pm .005$   
INTERPRET GEOMETRIC  
TOLERANCING PER:

	NAME	DATE
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CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

REL INC

TITLE:

SIZE <b>B</b>	DWG. NO. 790-00-000	REV
SCALE: 1:100 WEIGHT:		SHEET 1 OF 3





**Fluorescent Penetrant  
Inspection Line  
Model #FPI467860**







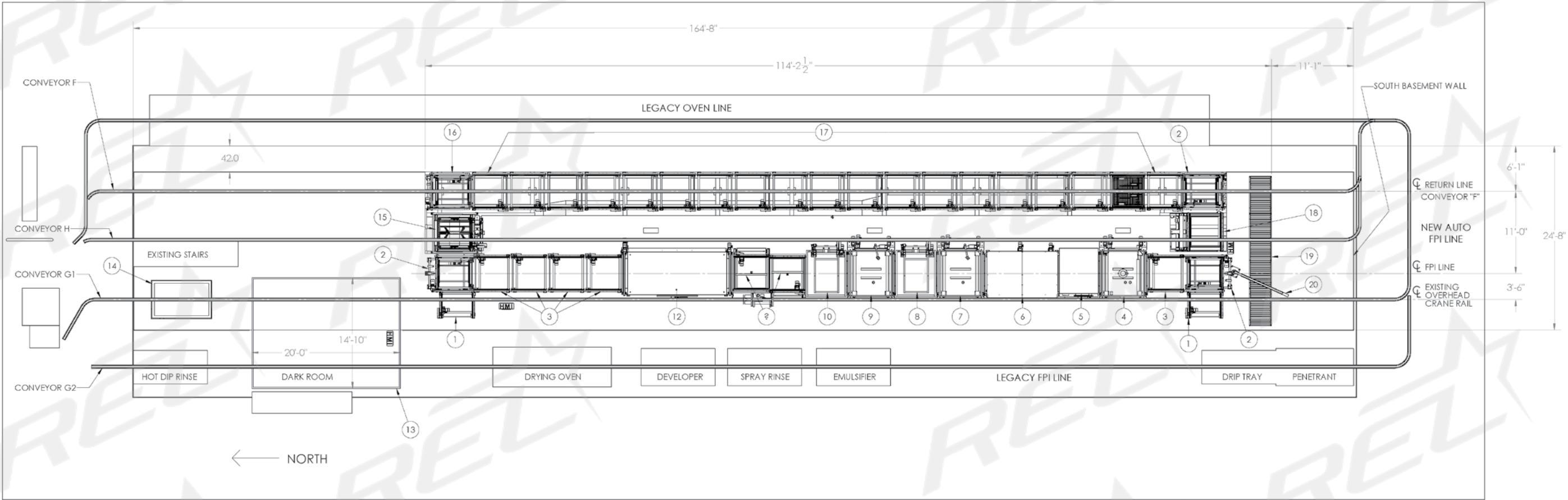


**Fluorescent Penetrant  
Inspection Line  
Model #FPI244848**

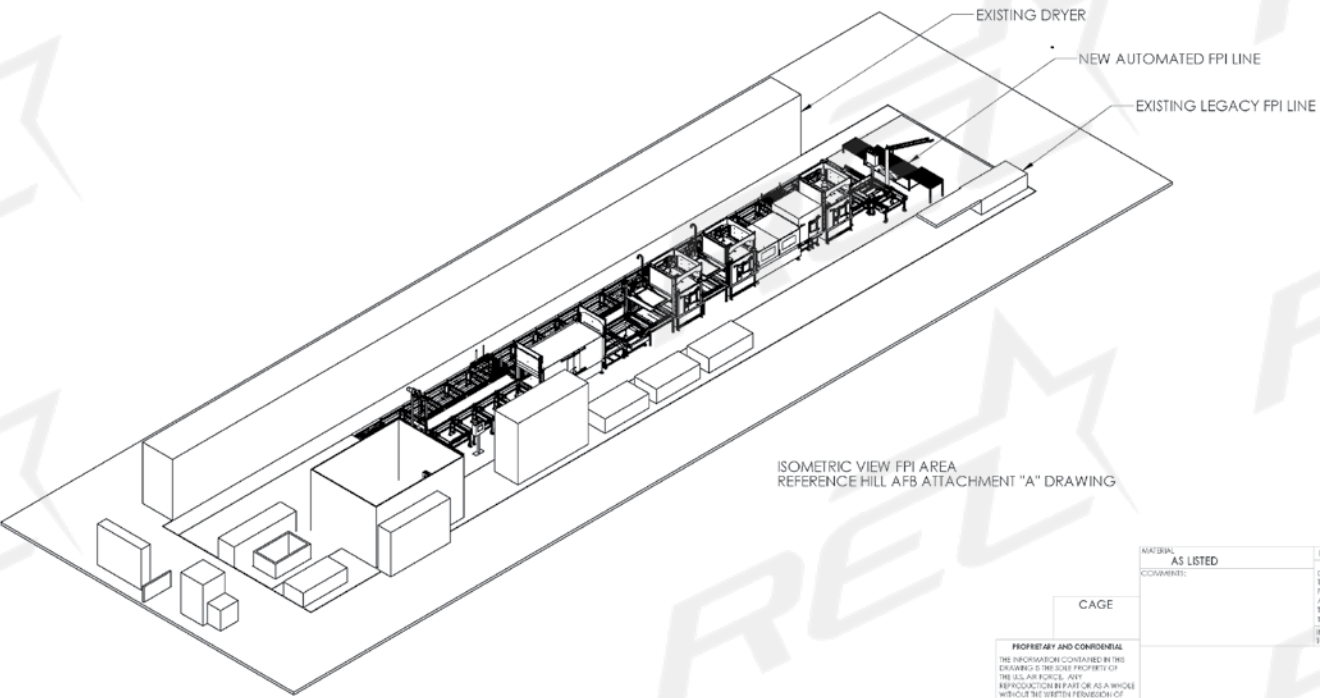


PLAN VIEW AUTO FPI LINE LAYOUT

- NOTES:
1. AREA FOR NEW AUTO FPI LINE 164'-8" X 24'-8".
  2. NEW AUTO FPI LINE LOCATED IN PLACE OF EXISTING EAST FPI LINE AND DECOMMISSIONED CLEANING LINES. OLD EQUIPMENT TO BE REMOVED PER ATTACHED DEMOLITION DRAWINGS.
  3. WEST LEGACY FPI LINE AND DRYING OVEN TO THE EAST OF AUTO FPI AREA REMAIN AS SHOWN.
  4. EXISTING DARK ROOM WITH CURTAIN AND LIGHTING UPGRADES PER SPEC.
  5. REFERENCE OVERHEAD CONVEYOR INTEGRATION DRAWING FOR LOAD STOP POSITIONS.
  6. REFERENCE HILL AFB ATTACHMENT "A" FPI AREA DRAWING FOR EXISTING EQUIPMENT LAYOUT.



NUMBER	STATION NAME	WETTED	DRY
1	LOAD/UNLOAD STATION		X
2	TRANSFER STATION		X
3	DWELL STATION		X
4	PENETRANT STATION, ELECTROSTATIC	X	
5	INSPECTION/TOUCH-UP STATION	X	
6	COVERED DWELL STATION, 2-POSITION	X	
7	PRE-RINSE STATION	X	
8	EMULSIFIER DIP STATION	X	
9	POST-RINSE STATION	X	
10	DEVELOPER DIP STATION	X	
11	TILT/DWELL STATION	X	
12	DRYER, 3-POSITION	X	
13	INSPECTION BOOTH		X
14	HOT WATER RINSE	X	
15	CARRIER WASH	X	
16	COOLING TRANSFER CONVEYER	X	
17	RETURN CONVEYORS		X
18	ELEVATOR STATION		X
19	ROLLER CONVEYOR TABLE		X
20	CRANE		X



ISOMETRIC VIEW FPI AREA  
REFERENCE HILL AFB ATTACHMENT "A" DRAWING

QUANTITY: -

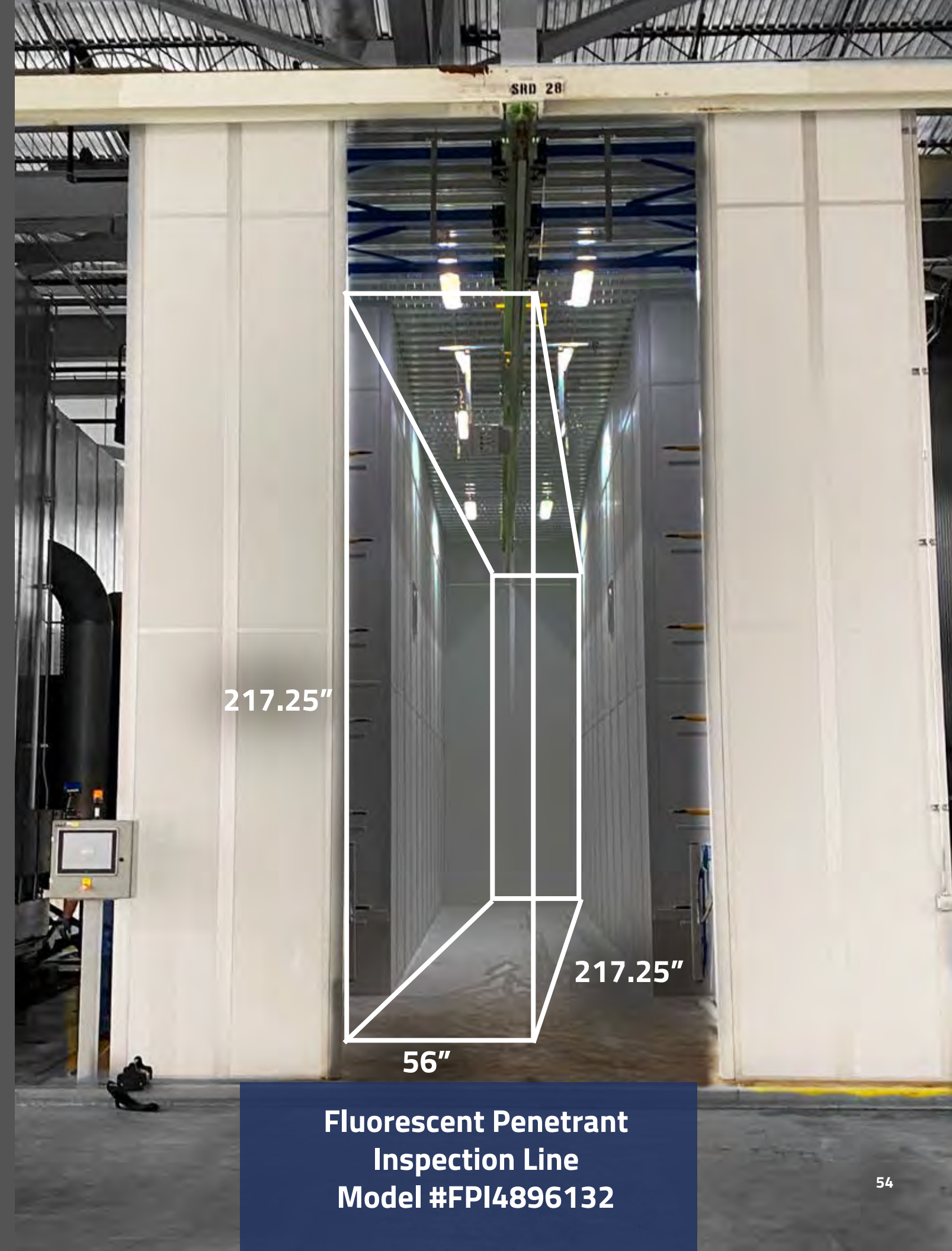
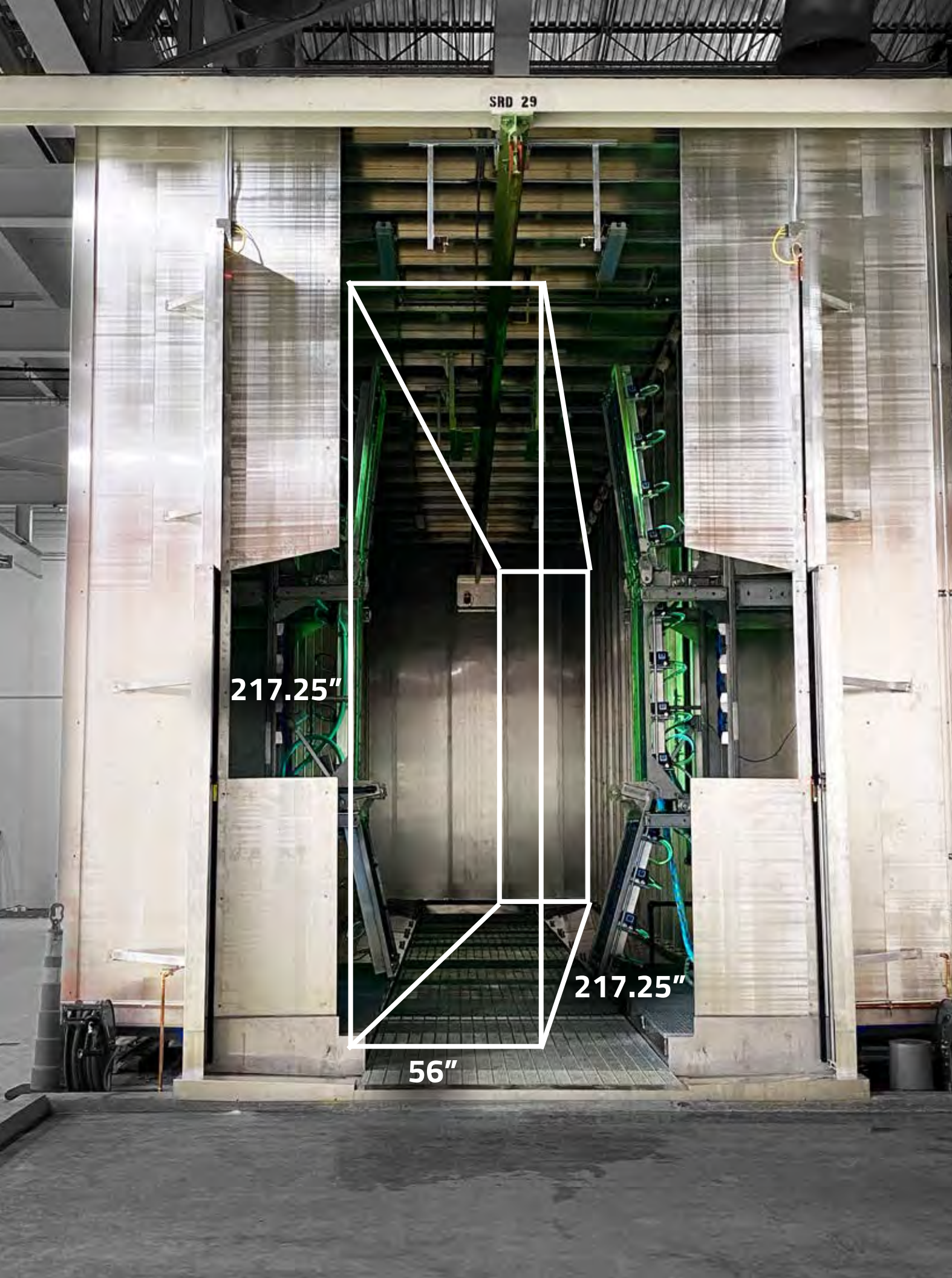
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CAGE								TITLE: FPI LINE LAYOUT	
PROPERTY AND CONFIDENTIAL								SIZE DWG. NO. REV	
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								SHEET 1 OF 1	





**Fluorescent Penetrant  
Inspection Line  
Model #EXBF57630144**





**Fluorescent Penetrant  
Inspection Line  
Model #FPI4896132**

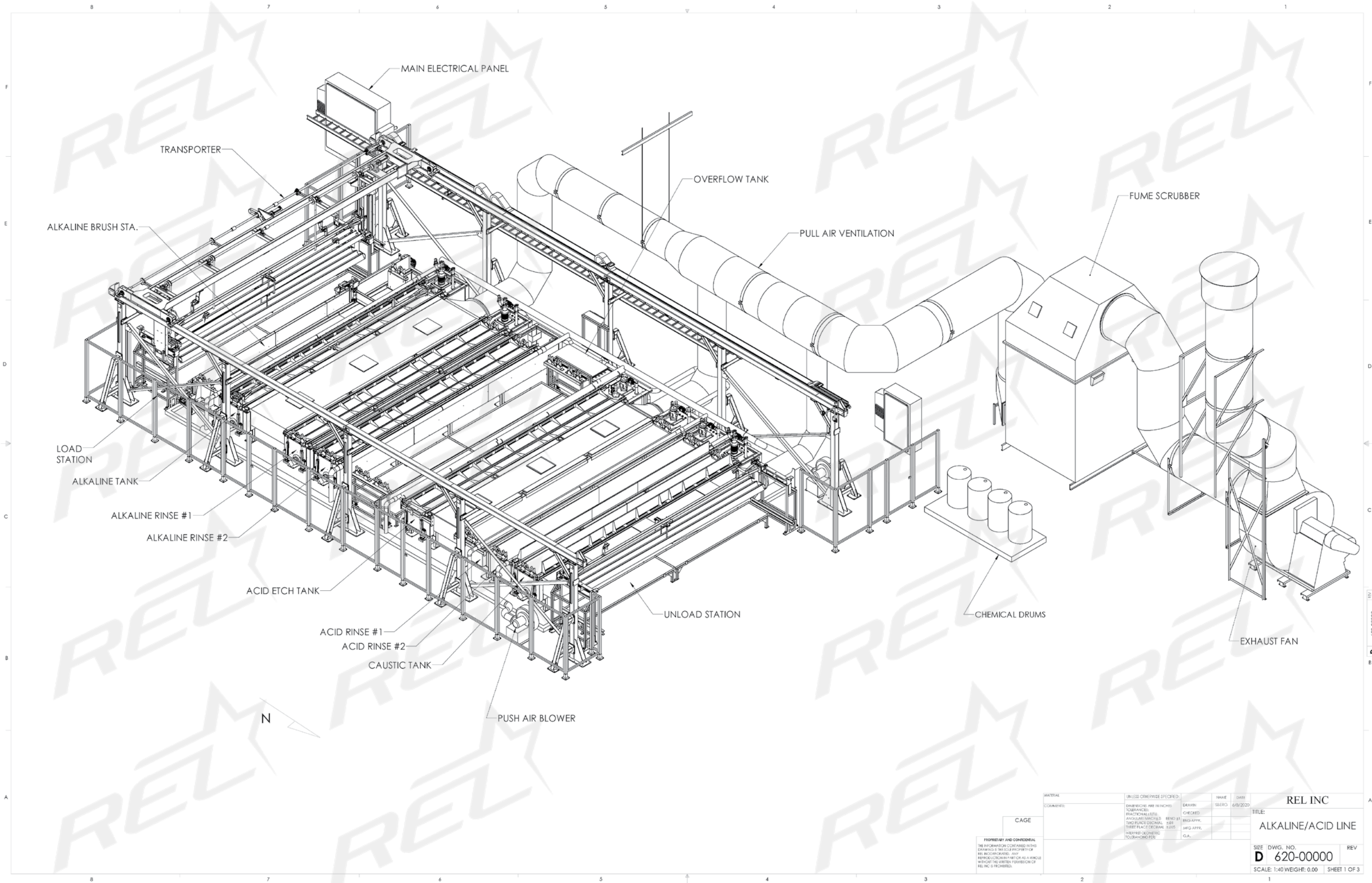




Part envelope size  
21'x24"x14"

Cleaning and Etch Line  
Model #WPR2930025





MATERIAL		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	REL INC	
COMMENTS:		DIMENSIONS ARE IN INCHES		DRAWN	6/8/2020	TITLE:	
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		FRACTIONAL SIZES		ENG APPR.		SIZE DWG. NO.	
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		TOLERANCES PER					
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