Generating Clean Nitrogen for Safe Food Processing

Jatinder Tiwana
Specialty Gas Canada
Keynote Speaker

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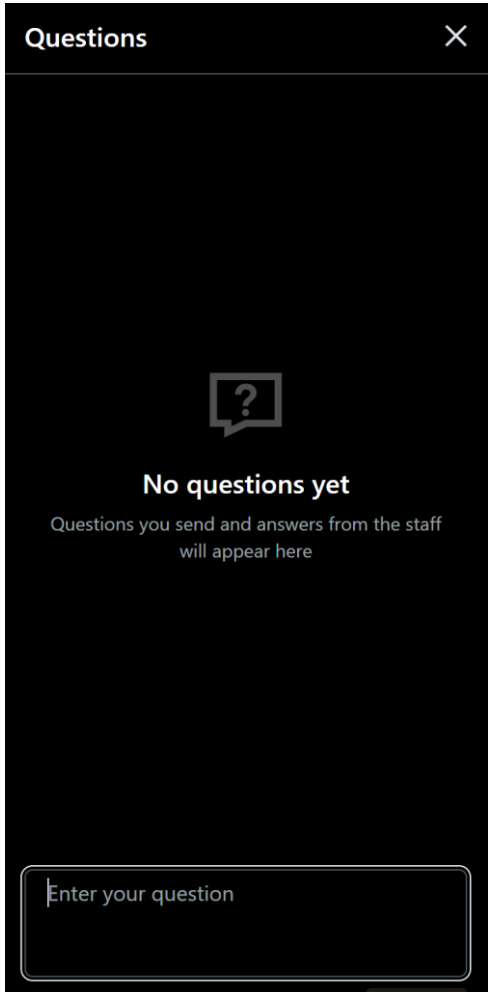
Q&A Format



- Panelists will answer your questions during the Q&A session at the end of the Webinar.

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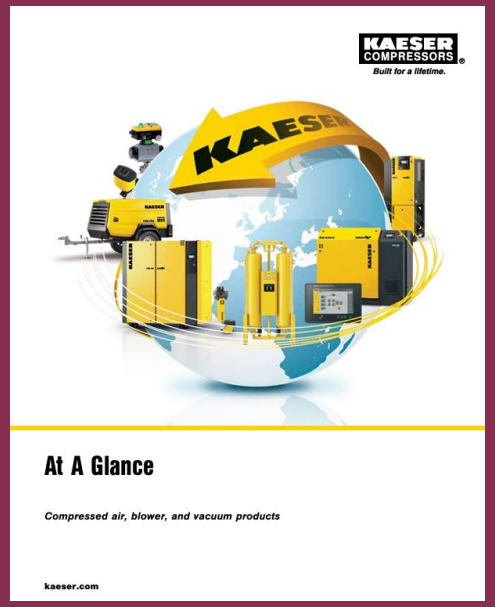

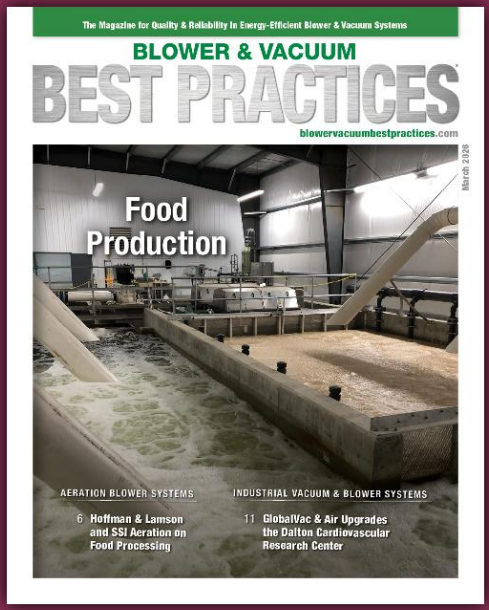

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Disclaimer

All materials presented are educational. Each system is unique and must be evaluated on its own merits.

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Generating Clean Nitrogen for Safe Food Processing

Introduction by

Compressed Air Best Practices® Magazine

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About the Speaker

Jatinder Tiwana
Specialty Gas Canada

- CEO, Specialty Gas Canada
- 20+ years in industrial gases and on-site generation
- Expertise in Nitrogen applications for food, laser, and electronics
- Mechanical engineering degree; MBA from Manchester Business School

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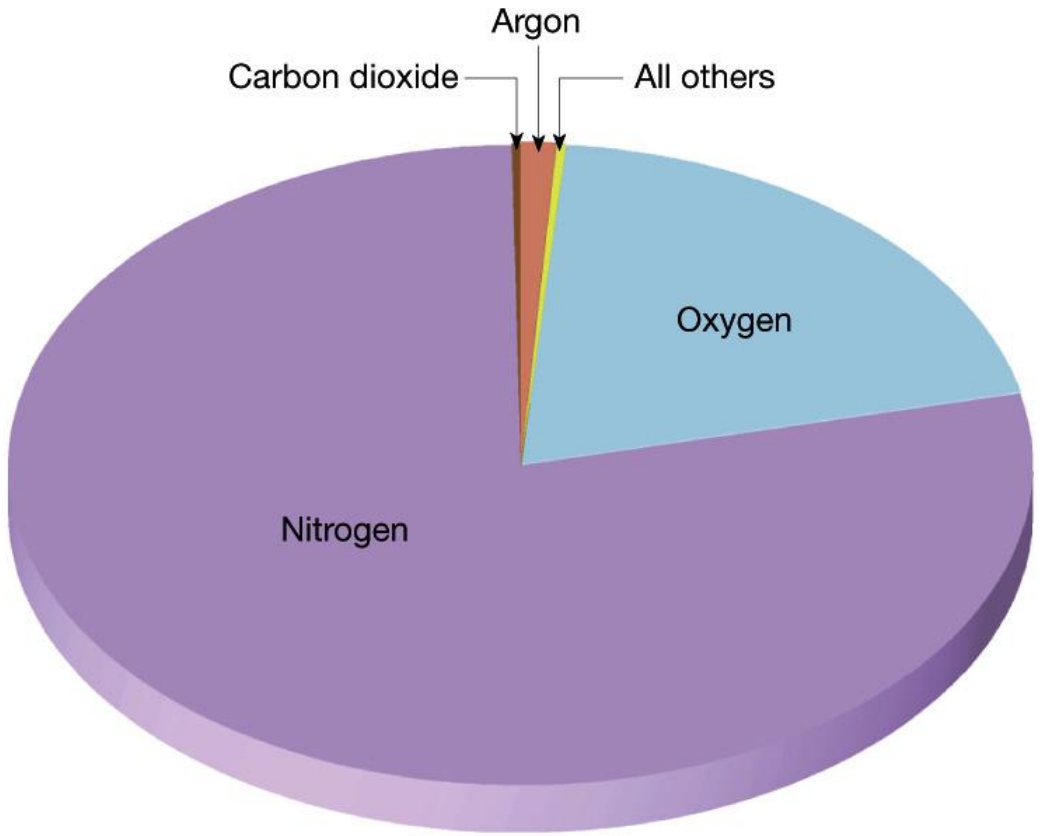
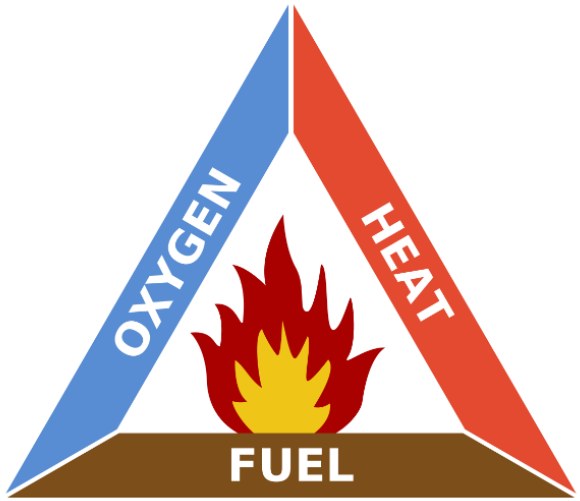
Basics – Composition of Air

- **Nitrogen** **78.08%**
- **Oxygen** **20.95%**
- Argon 0.93%
- CO_2 0.04%
- Other Gases 0.002%



What is Nitrogen (N_2)? Properties & Why It Matters?

Prevent oxidation



Prevent the risk of combustion

Prevent bacterial growth

- Inert: it does not easily react with other substances, making it a safe "buffer" gas.
- Dry: Below -40 Degrees Celsius (Moisture Free)
- Non-flammable: It does not burn and does not support combustion.
- Completely colourless, odourless, and tasteless.

Why Food Processors Use N_2?

Extends shelf life + Maintains quality + MAP packaging

Product	Recommended Nitrogen (N_2) & other Gases Purity in MAP	An Estimated Shelf Life by maintaining the recommended Purity
Coffee	99.5% N_2 and 0.5% O_2	18 Months
Vegetables	98% N_2 and 2% O_2	3 Weeks
Roasted/Dried Food	99% N_2 and 1% O_2	18 Months
Fruits	97% N_2 and 3% O_2	4 Weeks
Bread	20% N_2 and 80% CO_2	10 Weeks
Poultry meat	50% N_2 and 50% CO_2	2 Weeks
Cooked Meat	75% N_2 and 25% CO_2	2 Months
Potato Chips	97% N_2 and 3% O_2	6 Months
Pasta	80% N_2 and 20% CO_2	3 Months
Wine	98% N_2	6 Months
Salad	80% N_2 and 20% CO_2	3 Weeks
Lettuce	97% N_2 and 3% O_2	3 Weeks

Note: Recommended MAP gas mixtures are for reference only. Final composition is determined by the food manufacturer based on product requirements.

Learn more: https://www.specialtygas.ca/blog/learn-how-to-boost-product-freshness-with-on-site-nitrogen-in-modified-atmosphere-packaging

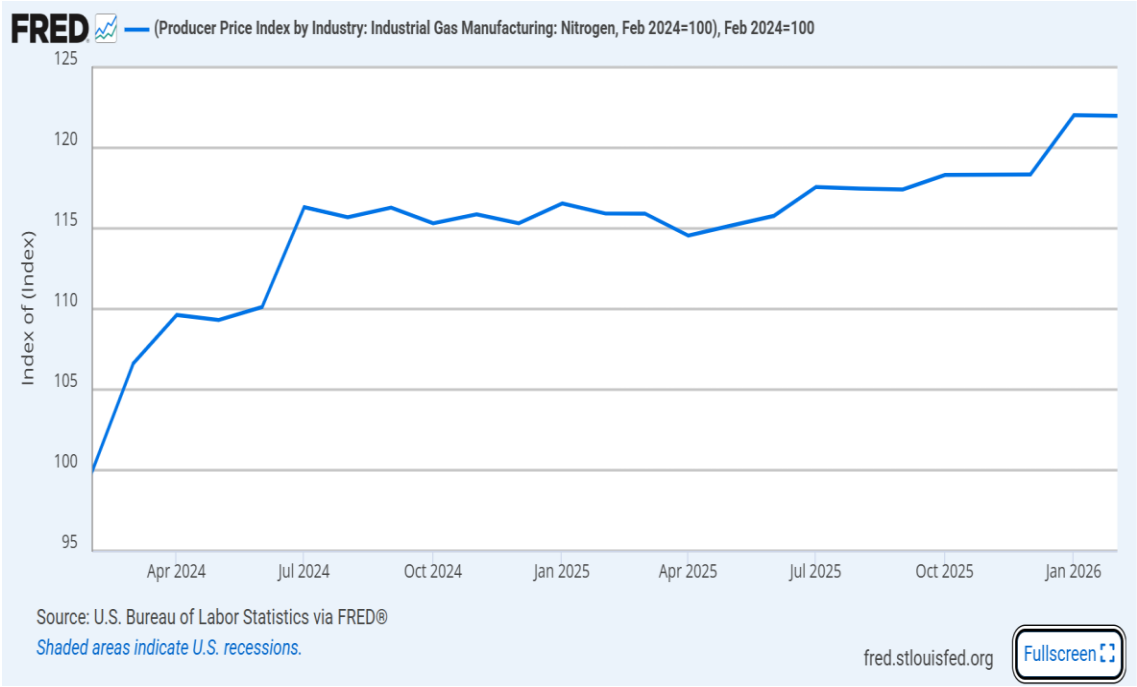
How Do Food Manufacturing Plants Source N_2?

True Cost of Delivered N_2 Gas & Trend

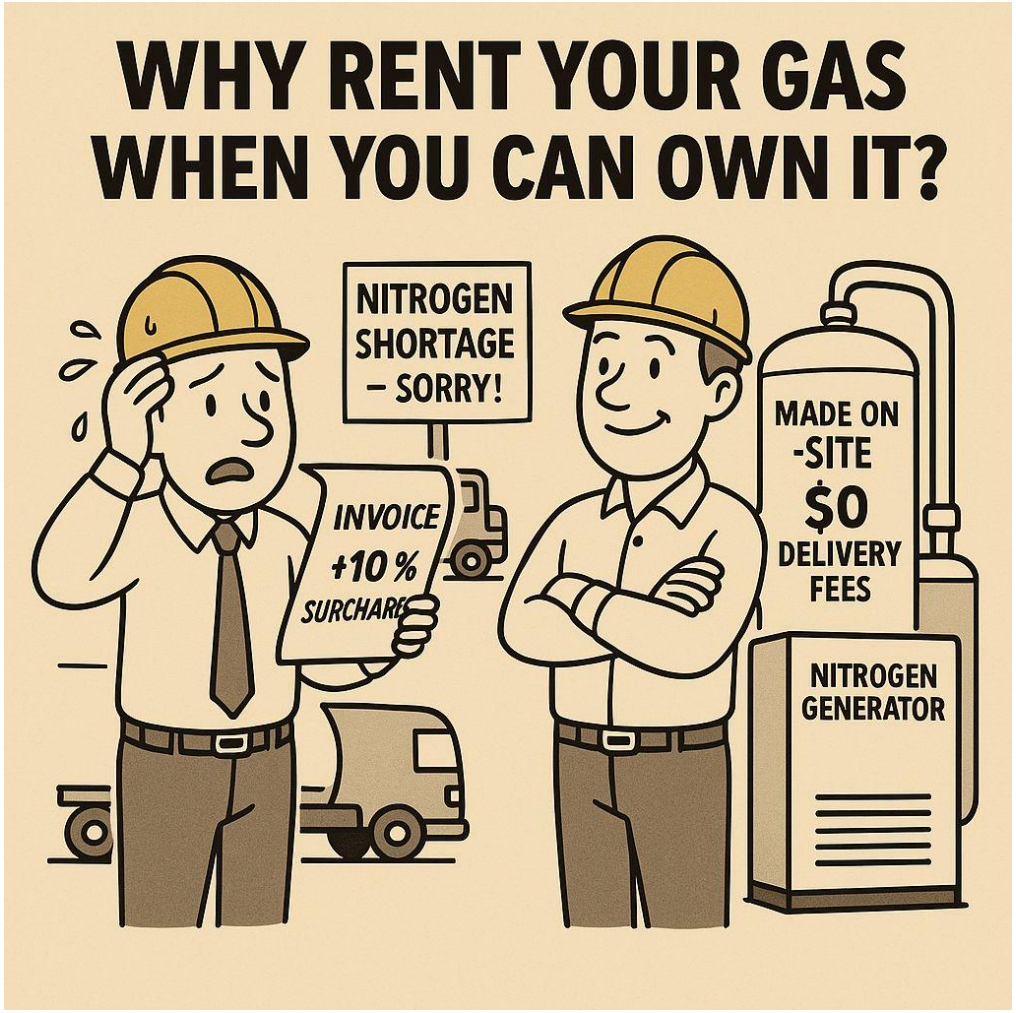
Actual + Hidden Costs

- Gas cost
- Delivery charges
- Tank rental
- Losses
- Inflation
- Labour/Follow-ups
- Production Disruptions

PPI Trend



Bulk supply vs. On-site N_2 Gas generation



- No more tanker deliveries or cylinder packs will be needed.
- Eliminate all Safety Risks with movement.
- Substantial Carbon Footprint Reduction.
- Reduce your nitrogen gas cost by up to 90%.
- Eliminate the pricing increase of Industrial Gases.
- No contracts (100% Flexibility).

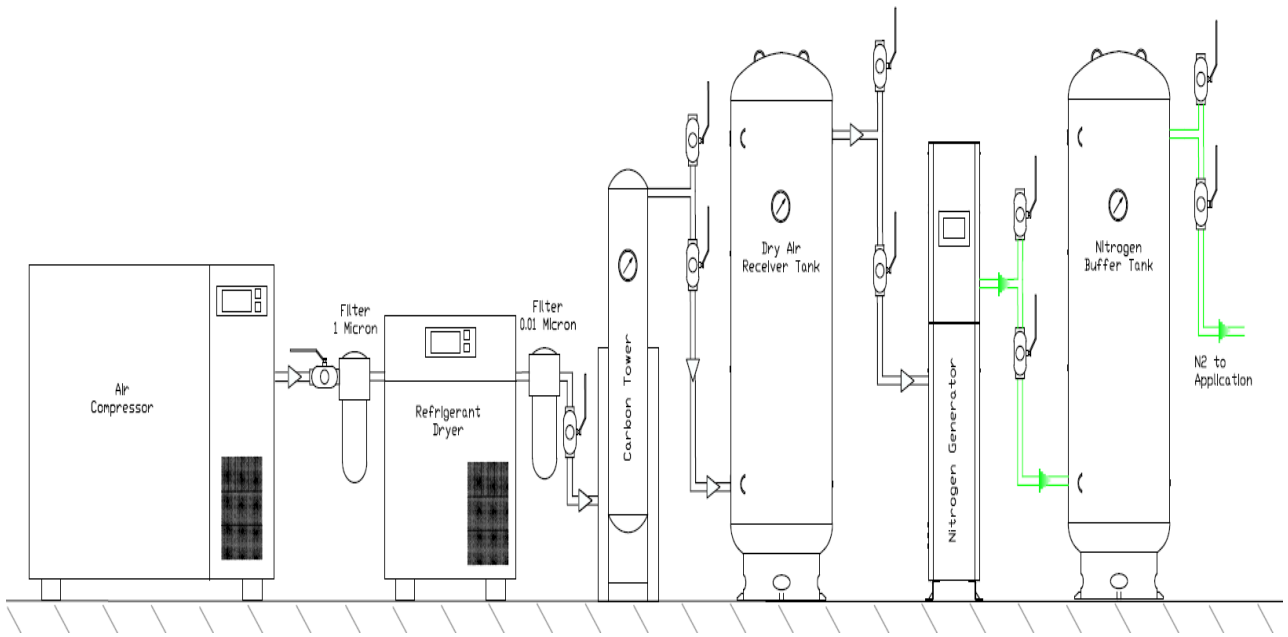
Food Grade N_2 Standards & Compliance

Component	Standard	Nitrogen
Purity	EC	>99%
	JECFA	
Moisture	EC	<0.05%
	JECFA	
CO	EC	<10 vppm
	JECFA	
NO/N02	EC	<10 vppm
	JECFA	
Total hydrocarbons	EC	<100 vppm
	JECFA	
Residual Gases	EC	<1% Oxygen
	JECFA	

- The Joint FAO/WHO Expert Committee on Food Additives (**JECFA**) is an international scientific expert committee, administered jointly by the FAO and WHO since 1956.
- **EC Food Grade** refers to materials that comply with European Union regulations (specifically Regulation (EC) No 1935/2004), ensuring they are safe for contact with food.

Food Grade Compliant & Certified Nitrogen Generation System.

Designing a Food-Compliant N_2 System



Air Compressor
- Oil Free
  - OR
- Lubricated – Food Grade

Dryer
- Class 2 Dew Point
  - OR
- Class 4 Dew Point

Filtration
- Oil & Particulate Filtrations
- Activated Carbon Filter OR Tower

Storage
- Sizing of Pressure Vessels for Both Air & N2

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Maintaining Compliance Over Time & Safety Tips

Follow SQF (Safe Quality Food) Guidelines

Align systems and processes with SQF requirements

Core Compliance Practices

Standard operating procedures (SOPs)
Regular maintenance
Accurate record keeping
Timely corrective actions

Don’t cut corners. Compliance protects your product, your brand, and your customers.

Quality Assurance

Compressed air quality testing
Nitrogen purity and quality testing
Annual leakage testing to ensure system efficiency

People & Responsibility

Training for new team members
Engage qualified specialists

Safety Considerations – Food Plants

Case Study – Food Packaging Plant - Toronto

CHALLENGES WITH LIQUID NITROGEN

- High Cost (~$5,000/month)
- Freezing in Pipes & Valves
- Production Downtime *(Dewar Changeovers)*
- Supply Delays & Unreliability
- No Usage Visibility

OUR SOLUTION

- On-Site Nitrogen Generation System
- Food-Grade Compliant Design
- 600 LPM Continuous Supply (24/7)
- Turnkey Installation + Air Treatment
- Training & Maintenance Support

RESULTS & IMPACT

Eliminated	Reliable	Better	ROI in	Long-Term
Freezing & Downtime	24/7 Supply	Process Control	~18 Months	Cost Savings

KEY TAKEAWAY | *On-site nitrogen generation delivers reliability, cost savings & consistent food quality – while eliminating supply risks.*

About Us – Specialty Gas Canada

- Customer-focused, solutions-driven approach
- Complete turnkey nitrogen & oxygen generation systems
- Backed by a skilled team of certified technicians
- Responsive and accessible, working closely with end users
- Capable of delivering complex, large-scale projects
- Serving customers across North America
- Proven success from concept through execution
- Extensive experience in 50+ applications, with strong expertise in Food, Laser Cutting, and Electronics
- Learn More

Q&A and Thank you!

ChatGPT probably knows everything… I'm still learning.

But I'll do my best to answer your questions. So go easy on me☺

Thanks for listening, and feel free to ask anything.

About the Speaker

Neil Mehltretter
Kaeser Compressors

- Technical Director at Kaeser Compressors
- 20+ years of experience in compressed air system design and optimization
- Recognized authority on system assessments, energy savings, and operational improvements
- Certified Energy Manager
- Chair of CAGI's System Assessment Committee

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Designing and Maintaining Compressed Air Systems supporting Onsite Nitrogen Generation

Neil Mehltretter
Technical Director
Kaeser Compressors, Inc.

04/16/2026

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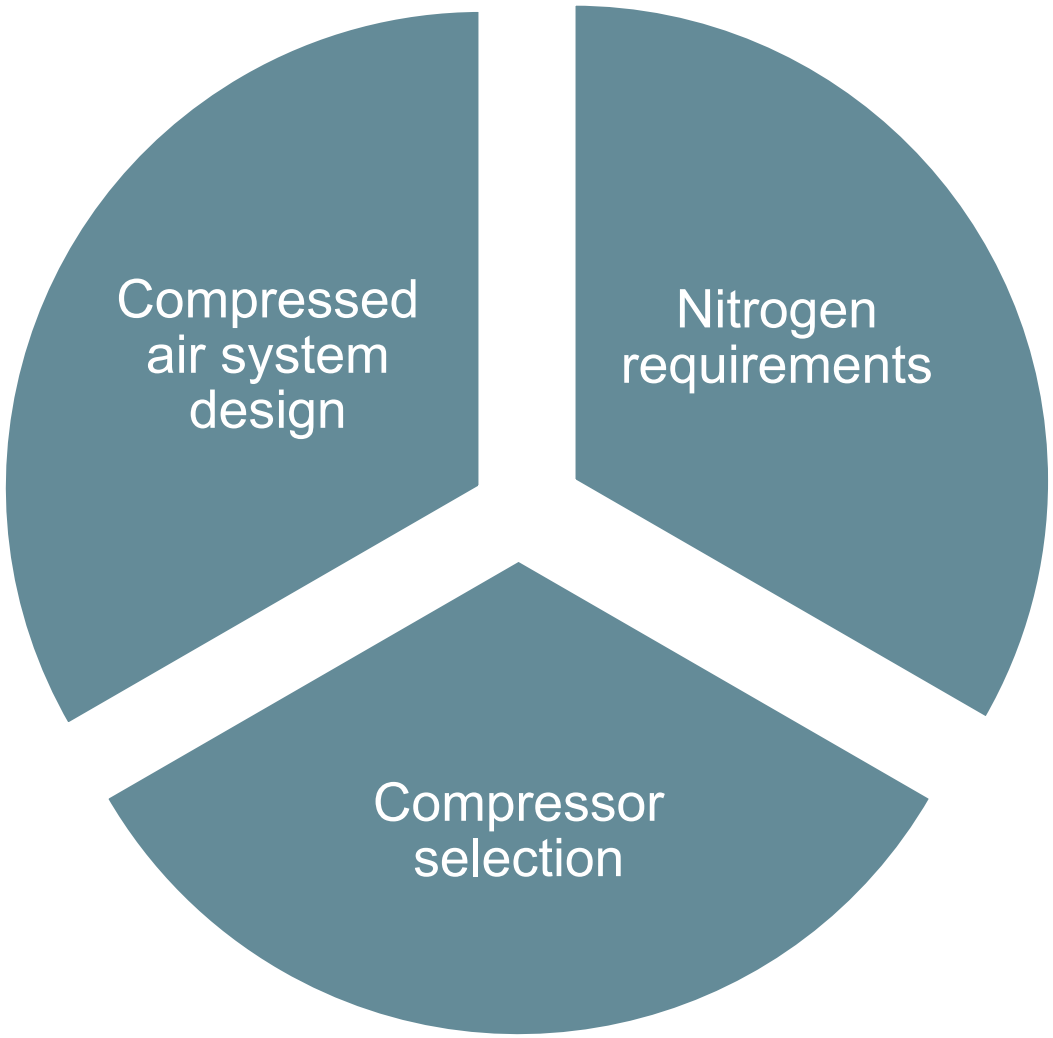
Topics

- Where to start
  - Nitrogen requirements
  - Compressor selection
  - Compressed air system design
- General maintenance requirements



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Where to start

- Nitrogen purity
  - Ultra high purity → Electronics (semiconductor), Pharmaceutical, Aerospace, Metallurgy, Laboratory, Heat Treatment
  - Industrial Grade → Chemical Blanketing, Food and Beverage, Metals (laser cutting), Vessel Purging
  - Low Purity → Fire Prevention, Oil and Gas, Material Transport

N_2 Purity	O_2 %	O_2 ppm
99.9995%	0.0005%	5
99.999%	0.001%	10
99.995%	0.005%	50
99.99%	0.01%	100
99.95%	0.05%	500
99.9%	0.1%	1000
99.5%	0.5%	5000
99%	1%	
98%	2%	
97%	3%	>5000
96%	4%	
95%	5%	

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Where to start

- Nitrogen purity
  - The higher the purity, the higher the compressed air required
- ROI → as low as 1 to 2 years
  - Energy Cost + Annual Maintenance = Total Cost of Operation
- Compressed air system design
  - Selection will depend on the Nitrogen
    - Purity level
    - Outlet Pressure → defines Inlet Pressure
    - Flow (scfm, m3/m, scfh, lpm, etc.)
  - Under or oversizing can be costly
  - Under or over treating can be costly

Higher purity, the higher the compressed air

Look for ROI as low as 1 to 2 years

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Where to start

- Under sizing Nitrogen system can be costly
  - Production failures
  - Downtime
- Oversizing Nitrogen system can be costly
  - Energy Costs
  - Operating Costs
  - Capital Costs
  - Production failures
  - Downtime

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Where to start

- Under sizing Compressor can be costly
  - Production failures
  - Downtime
- Oversizing Compressor can be costly
  - Energy Costs
  - Operating Costs
  - Capital Costs
  - Production failures
  - Downtime
- Potential benefit by bringing Nitrogen generator onsite

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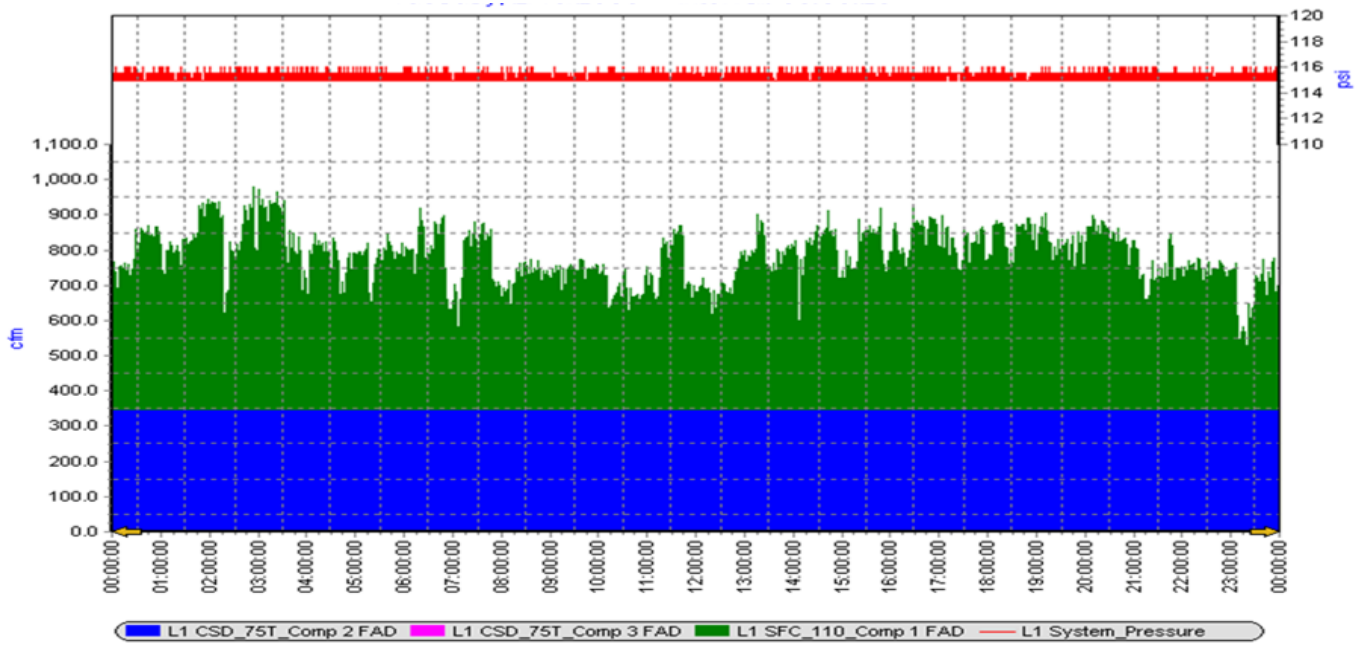
Equipment selection

- Compressor selection
  - Will depend on the application and specification
    - Oil-Flooded or Oil-Free for special cases
    - Variable speed driven compressor or fixed speed
  - Lubricant requirement
    - Consider Food Grade depending on the application



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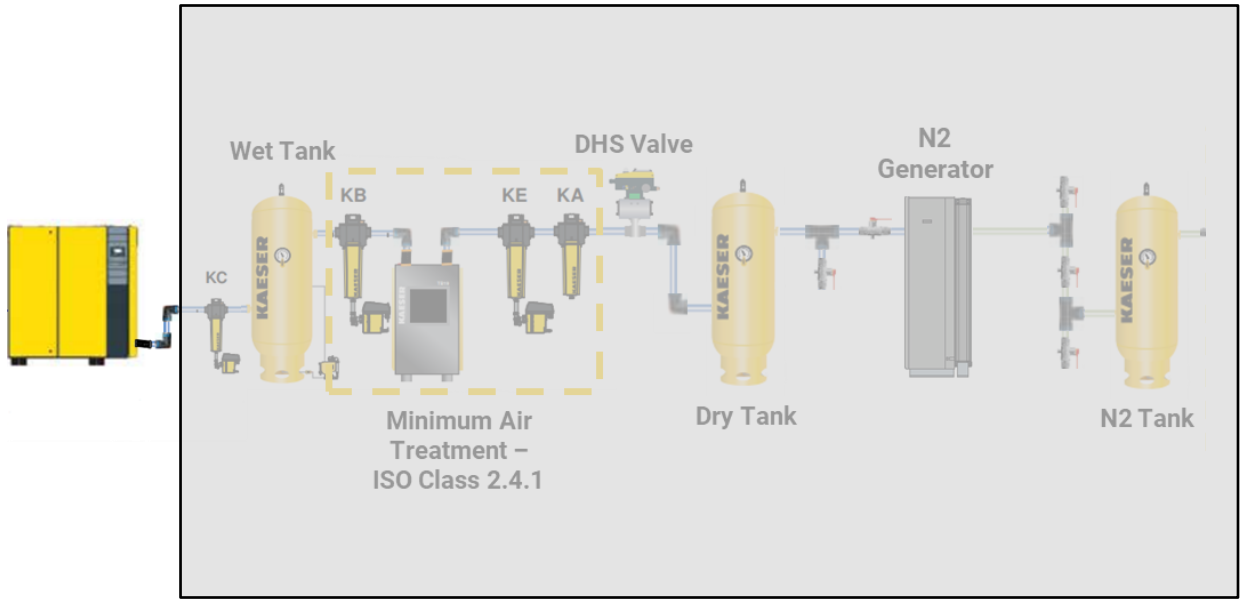
System design

- Compressor operation
  - Inlet pressure to the Nitrogen generator typically minimum of 115 psig
  - 125 psig maximum compressor outlet may be too low based on potential pressure drop
    - Consider 145 psig rated compressors



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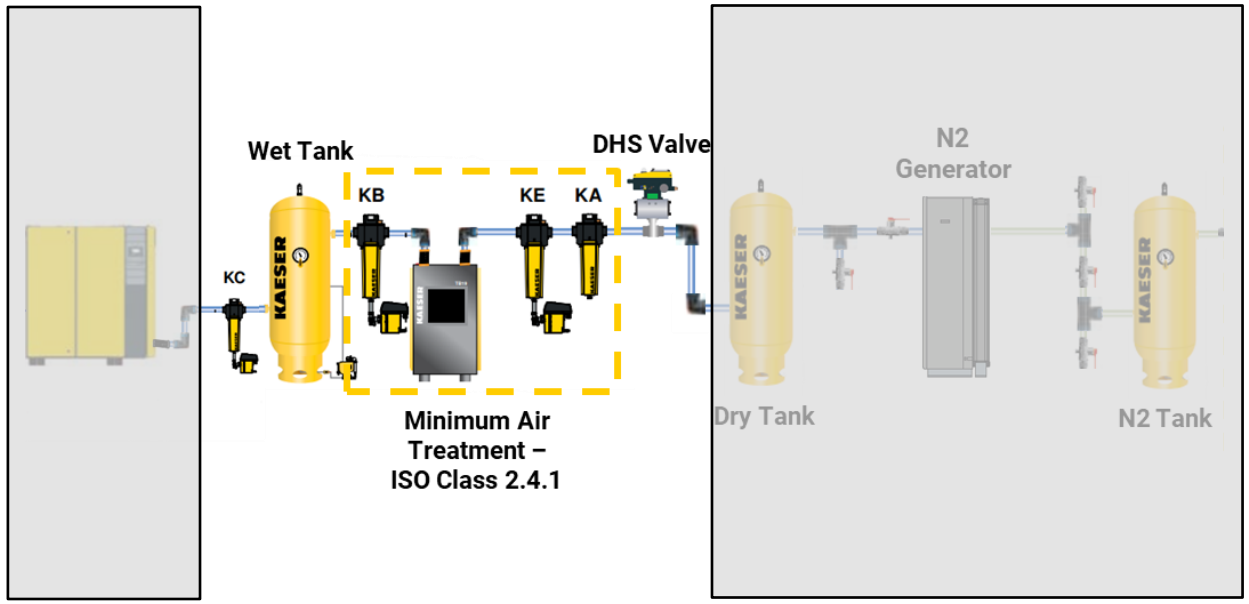
System design

- Air Treatment selection
  - Minimum Air Treatment required ISO 8573-1 Air Quality of 2.4.1
    - Coalescing filtration
    - Activated carbon tower or vapor adsorber filter*
  - Typically refrigerated dryers
  - Desiccant dryers can be used
    - Dependent on specification
    - Outdoor applications
    - Considerations
      - Purge requirement
      - Higher capital cost



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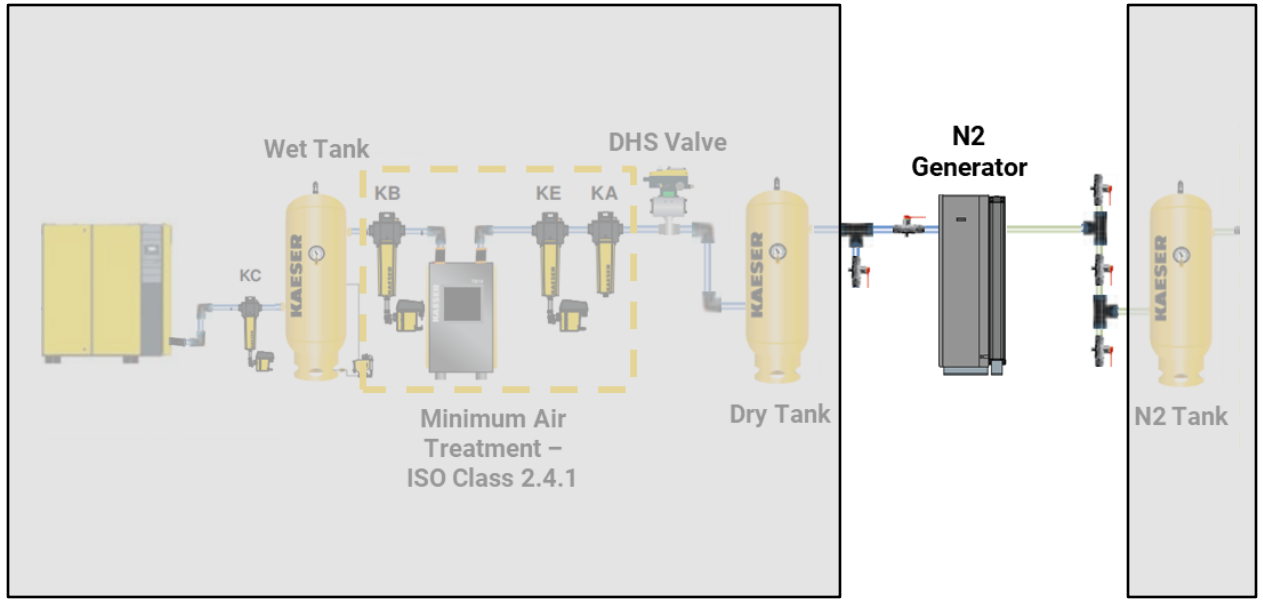
System design

- Nitrogen Generator design
  - Internal filtration
    - Pre-filter
    - Post-filter
    - Final protection
  - O2 sensor
    - Warnings and Alarms
    - Programmable
  - Inlet pressure monitoring
- External pressure dew point as required



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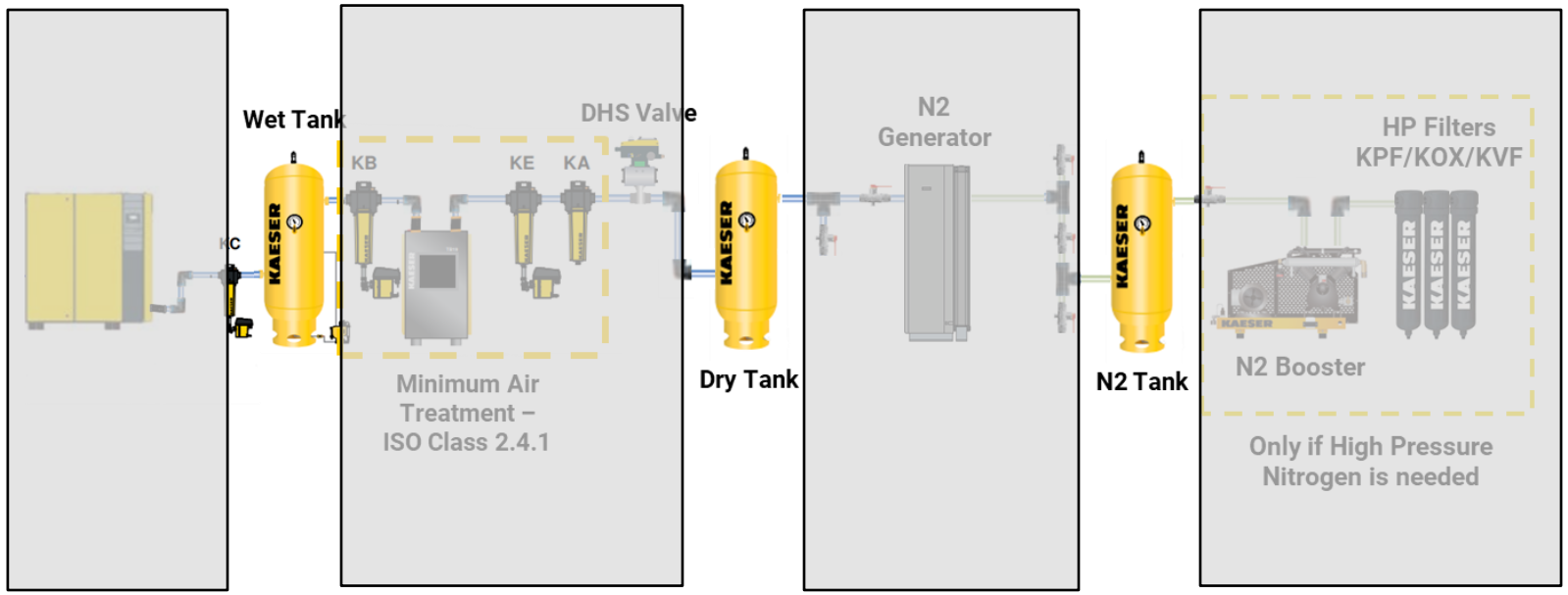
System design

- Storage
  - Recommended for control on the compressor side
    - Wet
    - Dry
  - Discharge of Nitrogen Generator
  - If boosters are installed, storage after boosters
  - Consideration for continuous use and intermittent use
    - Intermittent use, suggests larger tanks with higher pressure differential



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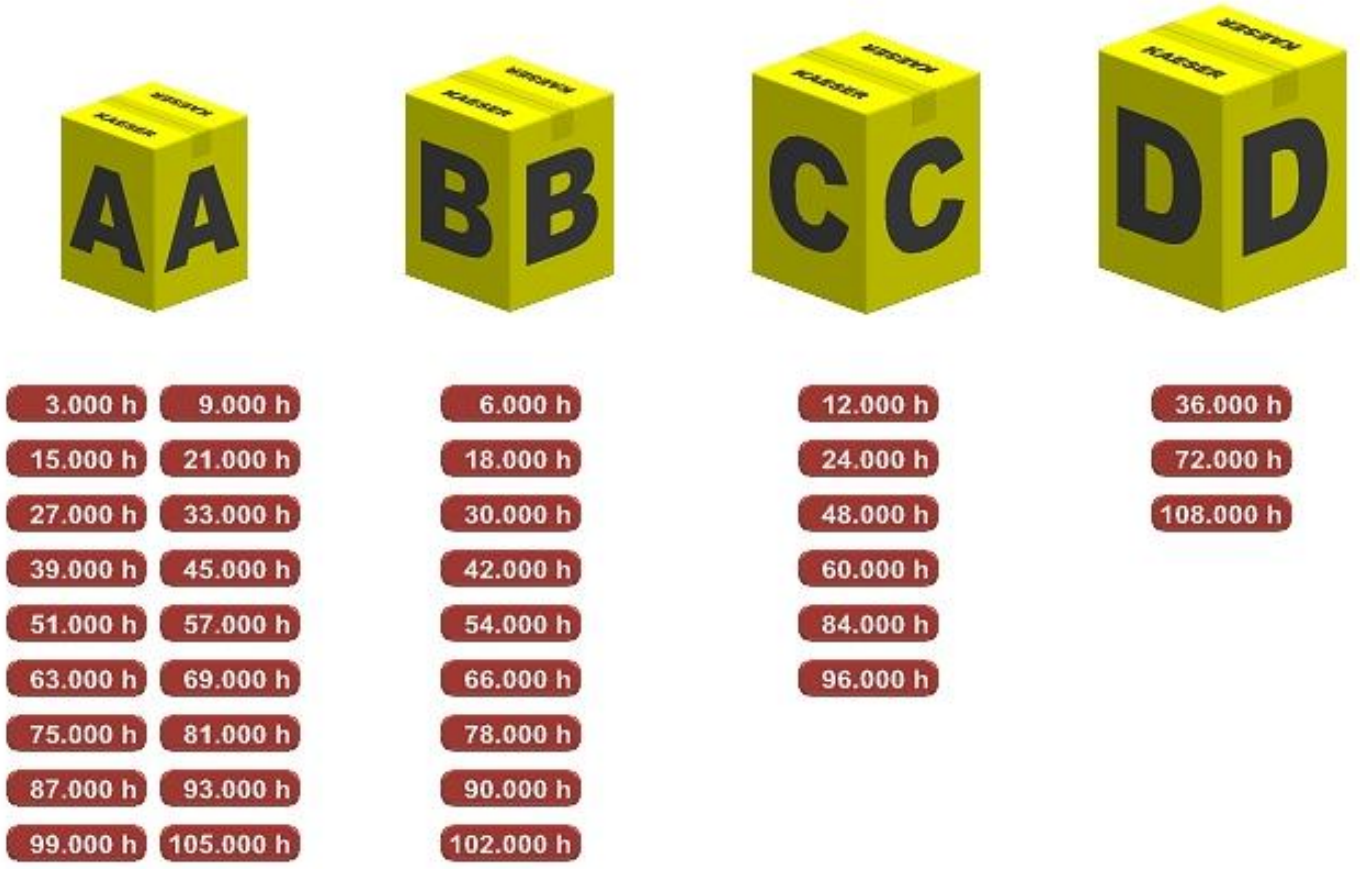
Compressor maintenance requirements

- Minor (A, B)
  - Inlet filters
  - Oil filters
  - Oil change
  - Motor lubrication (if needed)
- Major (C, D)
  - Minor items
  - Valve maintenance
  - Drive train
  - Motor maintenance
- **Don’t forget everyday housekeeping**



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Other equipment maintenance requirements

- Compressed air system
  - Dryers
  - Filters
    - Yearly or based on pressure drop
    - Activated carbon*
      - Vapor adsorber
        - 1000 hours of operation, dependent on load
      - Activated carbon tower
        - >8000 hours of operation, dependent on load
  - Drains
    - Yearly
  - Boosters (if applicable)
    - Oil change
    - Valve maintenance
    - Filtration

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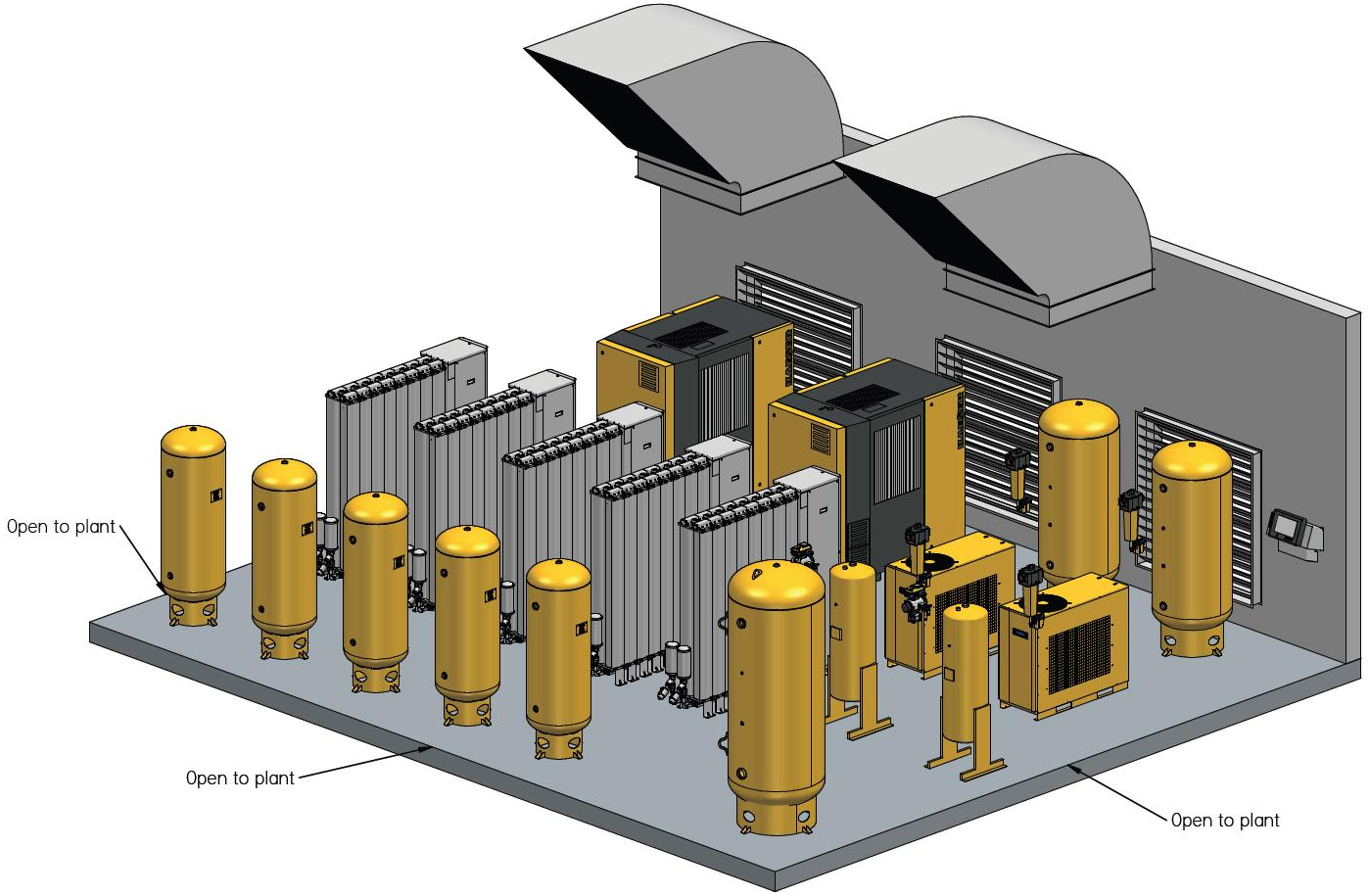
Other equipment maintenance requirements

- Nitrogen generator
  - Filters (yearly)
  - Monitoring sensor (~5 years)
  - Adsorbent life (as needed)
    - Dependent on air quality to Nitrogen generator
- **Don’t forget everyday housekeeping**



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Summary and Conclusions

- In order to size appropriately
  - Select the right Nitrogen purity, pressure, and flow
  - Select compressor type dependent on specification and application
  - Select appropriate air treatment and storage
- In order to operate properly
  - Complete maintenance at required intervals
    - Adjust as necessary
  - Keep the system and equipment clean
  - Review data

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According to European Commission (EC) food-grade standards, nitrogen must contain less than what % oxygen?

A	• 1%
B	• 5%
C	• 10%

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*By entering you are giving permission to announce your name if you are a winner

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Q&A

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Thank you for attending!

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