

Safety and Standards

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About Erlab



ABOUT ERLAB – Erlab is a global leader in air filtration solutions. Since 1968 we have been protecting laboratory personnel from harmful chemical and bio-aerosol emissions, improving the air we breathe both inside and out. We have a long-storied history starting with the invention of what is now known as ductless fume hood technology. Today, we continue to invent and improve upon the technologies we deliver with significant investments into our R&D employing several PhD's in molecular sciences, filtration and bio-aerosols.

Geoff Cmar – Regional Sales Engineer

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About ERLAB



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Chemical Handling Risk Assessment



Why it's needed?

- Captured and Retained
- Detected
- Expected filter life

Required by:

- ANSI Z9.5
- CSA Z316.5
- NFPA 45-2023
- AFNOR NF X 15-211
- SEFA 9A

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Chemical Handling Risk Assessment



SEFA 9A compliant review:

- Chemicals
- Quantities
- Processes
- Container type: open or closed
- Temperatures

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Standards



- ANSI Z9.5
 - Ductless Hoods
 - Chemical Risk Assessment is required
 - Redundant Safety Filter
 - Automatic detection of filter breakthrough
 - Detection of filter breakthrough at <25% TLV
 - Chemical list with capacity
 - Ducted Hood
 - Uses dilution to eliminate pollution.
 - Takes 450 feet from stack to achieve 1% concentration levels.
 - allowed to entrain up to 20% of allowable concentrations under normal operating condition for routine emission events and 100% for emergency emission events.
- Appendix 3- Evaluating the Performance of Laboratory Exhaust System – Design Criteria Development

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NFPA 45 2023 (draft)



- Second Revision draft completed, publishing Jan 2023
- Fully incorporates “Ductless Hoods”, not “Ductless Enclosure”
 - Traditional fume hood superstructure with Airfoil and Plenum
 - Redundant Safety filter
 - Automatic detection
 - Chemical List with capacity
 - Signage and labeling on each hood
 - 4” air gap between top of hood and ceiling
 - Annual reviews of usage

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Ductless Hoods Standards Harmonization?



Subject	ANSI Z9.5 -2022	NFPA45 -2023 draft	CSA Z316.5-2020	AFNOR NF X 15 -211 2009
Application Review	Required	Per SEFA-9A RP	Required	Required
Chemical Lists	Required w/Capacity	Required w/Capacity	Required	Required w/Capacity
Fume Hood Structure	Same as ducted FH	Same as ducted FH, otherwise “Ductless Enclosure”	Same as ducted FH	Not specified, filtration test standard only
Layers of Filtration	2 Layers (redundant)	2 Layers (redundant)	2 Layers (redundant)	Class 1 = 2 layers Class 2 = 1 layer
Breakthrough Detection	Continuous & automatic	Continuous & automatic	Continuous & automatic	Class 1 = Continuous & automatic
Detection Accuracy	<25% TLV	As per ANSI Z9.5	Fraction of OEL	<1% TLV
Containment Testing	ASHRAE 110 Std. or as set by owner	ASHRAE 110 Std. as specified by owner	References ASHRAE 110 Std.	AFNOR XP X 15-206 Std.
Monitoring/Alarming	Audible & Visual	Audible & Visual	Audible & Visual	Not specified

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Erlab's R&D Testing Laboratories



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Approved Chemical Lists



- Hundreds of chemicals, (represents thousands of chemicals within their chemical families)
- 98% of the commonly used chemicals,
- Required by SEFA 9 RP and AFNOR NF X 15-211



Test Chamber



GC-MS

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Materials and Processes Not Allowed



Not retained well: gaseous @ STP and low molecular weight.

1. Acetylene
2. Carbon Dioxide
3. Carbon Monoxide
4. Ethane
5. Ethylene Oxide
6. Helium and all Noble Gases
7. Hydrogen
8. Methane
9. Nitrogen Monoxide
10. Propylene
11. Propyne, Propane
12. SO_x and NO_x

Applications not recommended:

- Perchloric Acid, Radioisotope or Acid Digestion Hoods
- Highly exothermic reactions
- Mercury - Well retained but remains extremely toxic (TLV = 0.05 ppm) and difficult to detect
- High Toxicity compounds (e.g. organophosphorus)
- Lethal (e.g. Hydrogen Cyanide)

Applications that require specialty ducted hoods are likely not good candidates for filtration.

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Chemical Listing



Chemical name	Formula	CAS number	Suitable filter	Retention capacity (g)	Vapor pressure	MM (g/mol)	Boiling point (°C)	NIOSH 8h
AMINOCYCLOHEXANE	C ₆ H ₁₁ NH ₂	108-91-8	Neutrodine Unisorb	630	1.2 kPa	99	135	10 ppm
AMINOETHANE	C ₂ H ₇ N	75-04-7	Neutrodine Unisorb	114	116 kPa	45	17	10 ppm
AMINOMETHANE	CH ₅ N	74-89-5	Neutrodine Unisorb	36	353 kPa	31	-7	10 ppm
AMMONIA (30% solution)	NH ₃	7664-41-7	PF Ammonia + Neutrodine Unisorb	384	1003 kPa	17	-33	25 ppm
AMMONIUM CHLORIDE	NH ₄ Cl	12125-02-9	PF + HEPA or Neutrodine Unisorb	-	0.13 kPa	53,49	-	10 mg/m ³
AMMONIUM CHLORIDE FUME	NH ₄ Cl	12125-02-9	PF + HEPA or Neutrodine Unisorb	-	0.13 kPa	53,49	-	10 mg/m ³
AMYL ALCOHOL N	C ₅ H ₁₂ O	71-41-0	Neutrodine Unisorb	3416	0.259 kPa	88	138	-
ANHYDROUS HYDROGEN BROMIDE	HBr	10035-10-6	Neutrodine Unisorb	1626	0.15 kPa	80,91	-66	-
ANILINE	C ₆ H ₅ NH ₂	62-53-3	Neutrodine Unisorb	1944	0.09 kPa	93	184	-
AQUA FORTIS	HNO ₃	7697-37-2	Neutrodine Unisorb	1608	6.39 kPa	63	120	2 ppm

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Enhancing Safety



Performance & Compliance

Documentation

Ductless fume hoods must be accompanied by a booklet containing an exhaustive list of the chemical agents, that the manufacturer certifies, can be handled in the fume hood:

- The name of the chemical agent, its formula, its CAS number, its boiling point, its molecular weight, its vapor pressure, etc.
- **The reference of the adapted filter and its retention capacity** in accordance with the NF X 15-211 standard.
- **The type of air quality monitoring** recommended to control filter efficiency

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Thank you



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Enhancing Safety



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Type of handling	CHEMICAL NAME	TYPE OF CONTAINER	Opened / Closed	Dilution (%)	Temperature (°C)	Handling Frequency	Handling Quantity	Duration (min)
Recrystallization in Water	Acetanilide	BEAKER	Opened	100%	100°C	From 3 to 4	From 151 to 250 ml (or g)	From 21 to 30 min.
Recrystallization in Water	Benzoic Acid	BEAKER	Opened	100%	100°C	From 3 to 4	From 151 to 250 ml (or g)	From 21 to 30 min.
Recrystallization in Water	Adipic Acid	BEAKER	Opened	100%	100°C	From 3 to 4	From 151 to 250 ml (or g)	From 21 to 30 min.
EVAPORATION	Water	BEAKER	Opened	100%	100°C	From 3 to 4 handlings/month	From 26 to 50 ml (or g)	From 21 to 30 min.
WEIGHING	Activated Carbon	BEAKER	Opened	100%	100°C	From 3 to 4 handlings/month	From 6 to 10 ml (or g)	From 21 to 30 min.
THIN LAYER CHROMATOGRAPHY	Acetic Acid	TLC DEVELOPING TANK	Closed	100%	23°C	From 3 to 4 handlings/month	From 0 to 5 ml (or g)	From 5 to 10 min.
THIN LAYER CHROMATOGRAPHY	Ethyl Acetate	TLC DEVELOPING TANK	Closed	100%	23°C	From 3 to 4 handlings/month	From 0 to 5 ml (or g)	From 5 to 10 min.
THIN LAYER CHROMATOGRAPHY	Hexane	TLC DEVELOPING TANK	Closed	100%	23°C	From 3 to 4 handlings/month	From 0 to 5 ml (or g)	From 5 to 10 min.
WEIGHING	Aspirin	TUBE	Opened	1%	23°C	From 3 to 4 handlings/month	From 51 to 75 ml(or g)	From 5 to 10 min.
WEIGHING	Acetaminophen	TUBE	Opened	1%	23°C	From 3 to 4 handlings/month	From 51 to 75 ml(or g)	From 5 to 10 min.
WEIGHING	Caffeine	TUBE	Opened	100%	23°C	From 3 to 4 handlings/month	From 51 to 75 ml(or g)	From 5 to 10 min.
DISSOLUTION	Ethanol	TUBE	Opened	99%	23°C	From 3 to 4 handlings/month	From 0 to 5 ml (or g)	From 5 to 10 min.
THIN LAYER CHROMATOGRAPHY	Silica Gel (on TLC plate)	TLC DEVELOPING TANK	Closed	100%	23°C	From 3 to 4 handlings/month	From 6 to 10 ml (or g)	From 21 to 30 min.

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Enhancing Safety



Feasibility Study

Reference: GFH-218US769-0218

Containment	✓
Detection	✓
Neutrodine Unisorb Compatibility	✓
Neutrodine Unisorb Estimated Life Expectancy	✓

(Safety)

Filtration

GFH Model	M1	M2	M3	M4	M5	M6
Expected Filter lifetime	30 months	30 months	36 months	48 months	48 months	48 months
HEPA filters			✓			
Acid prefiltration			✓			
Ammonia prefiltration			✓			

(Filter Life)

(Pre-filter Options)

Detection

		Sensitivity
Molecode Solvents	X	Low
Molecode Acids	X	High

(Settings)

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