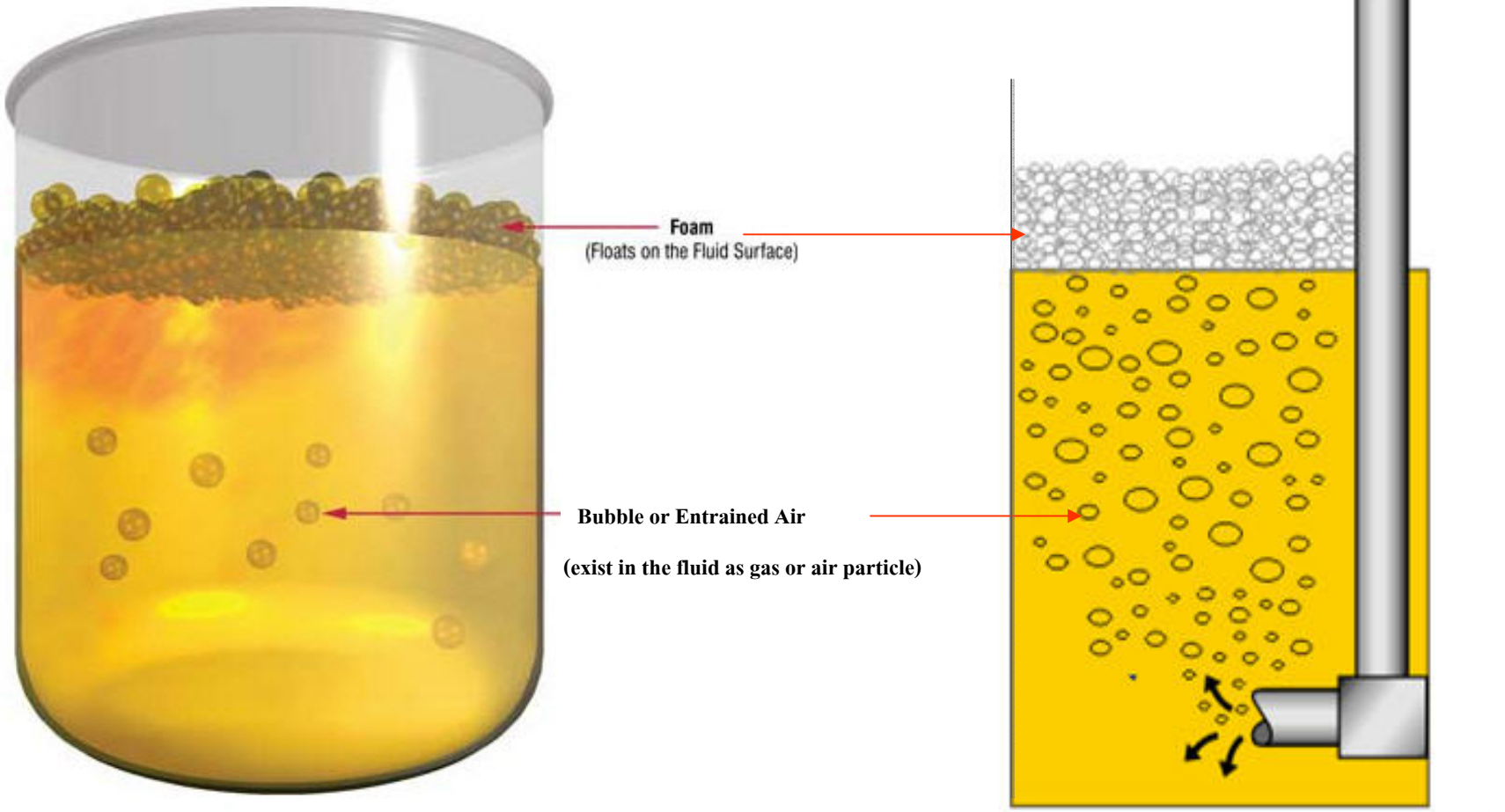
Foaming and Entrained Air are Air Contamination in Lubricant System.



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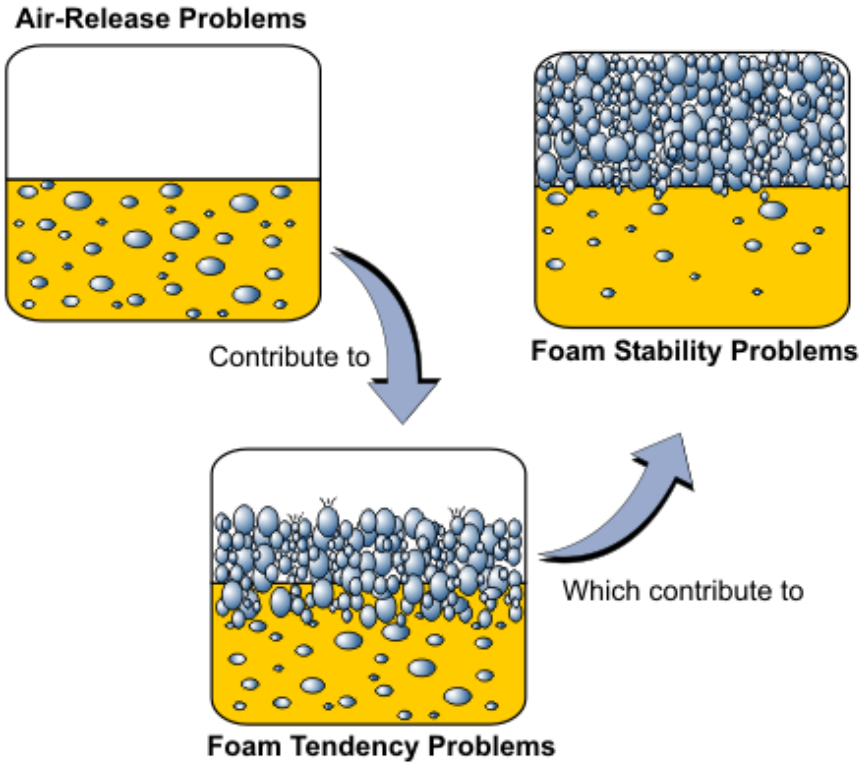
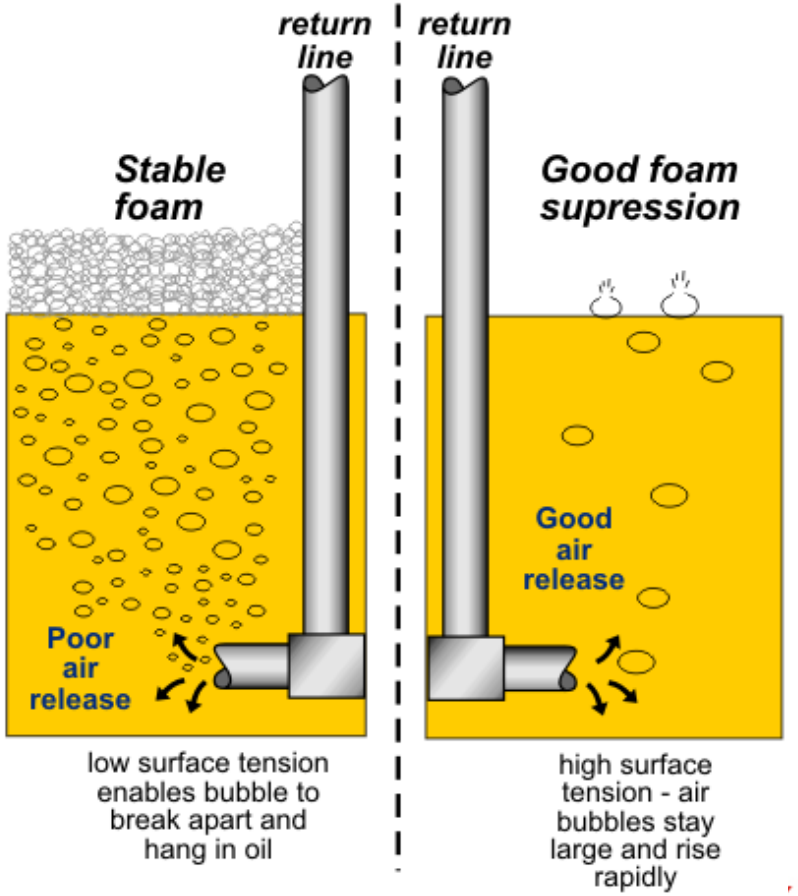
Causes of Air Contamination (foam &air bubbles)

- Low surface tension:
  - Oxidation
  - Polar contaminants
  - Water contamination
  - Solvents
  - Certain additives
- Small (crushed) air bubbles



- High oil viscosity
- Too much defoamant
- Solid suspensions that seed air bubbles



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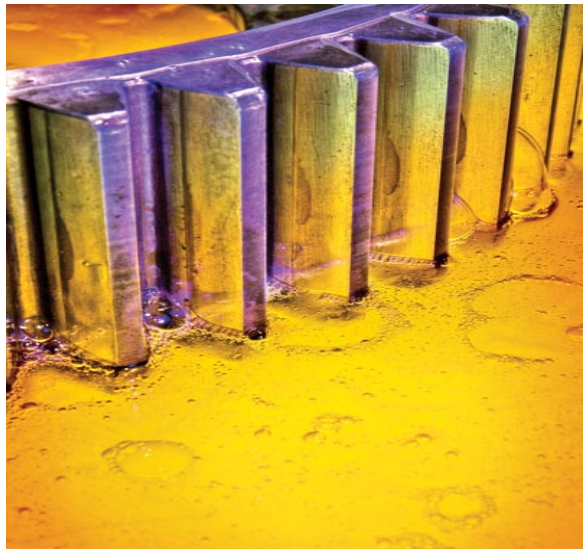
Oil and Machine Failure by Air Contamination

Air contamination (foam and entrained air or air bubbles) in lubricating oil can have negative effects on the machine and the lubricant

Air contamination (Foam and Air Bubbles) can damage a machine by

- Incomplete of oil films in bearing ,gears ,etc . Component wear due to reduced viscosity.
- Inability to maintain oil pressure (low oil pressure cause switch trip)
- Poor hydraulic ,turbine ,pump performance or failure (such as cavitation , erratic operation control ,loss of precision control ,vibration,etc)



Air contamination (Foam and Air Bubbles) can damage lubricating oil by

- Premature of lubricant degradation (increasing the rate of oxidation and thermal degradation)
- Drastic increase temperature due to microdieseling
- Reducing its heat transfer coefficient and ability .
- Depleting additives

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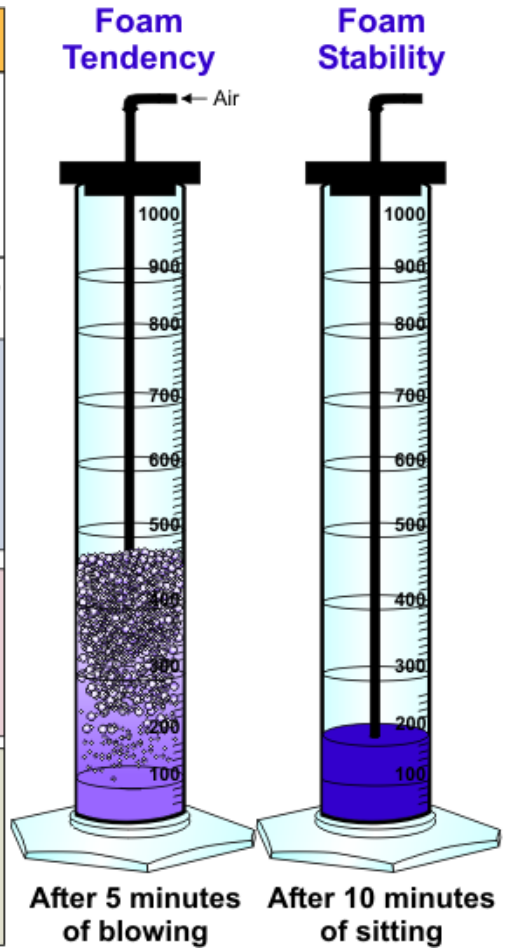
Foaming Characteristic (ASTM D-892) and Air Release (ASTM D-3427)

Test	Objective/ Summary	Applications	Typical Results Low	High
Air Release ASTM D3427 or IP 3B	Test determines the tendency of an oil to retain entrained air. Compressed air is blown into sample. Time required (minutes) for air to reach 0.2% by volume - determined by density.	Most industrial oils and hydraulic fluids	5	200 Minutes (low result is preferred)
Foam Tendency/ Stability ASTM D892	Test determines a lubricant's ability to resist foam formation and dissipate foam quickly.	Most industrial oils and hydraulic fluids	**Low** Tendency/ Stability	**High** Tendency/ Stability
	Sequence I - A 190-ml sample of oil is heated to 50°C and cooled to 24°C, a diffuser is immersed in the sample with air flow of 95 ml per minute for 5 minutes. The tube is disconnected and the volume of foam immediately recorded. Then the sample is allowed to stand for 10 minutes and the current foam volume recorded.		50/0 (Low is preferred)	200/50
	Sequence II - A 180-ml sample of oil is immersed in a 93°C bath. A diffuser is immersed in the sample with air flow of 95 ml per minute for 5 minutes, recording foam volume at the end of the blowing and settling period.		50/0 (Low is preferred)	300/100
	Sequence III - After the 93°C test has been completed, remove any remaining foam by stirring the sample. Remove the sample from the bath and cool to a temperature below 20°C. Place the cylinder in the 24°C bath and repeat the Sequence I procedure above.		50/0 (Low is preferred)	500/250



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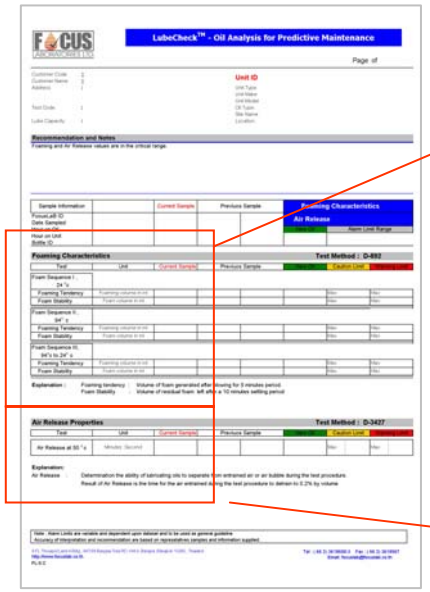
Test Report of Foaming Characteristic (ASTM D-892) and Air Release (ASTM D-3427)



Foaming Characteristics

Test	Unit	Current Sample
Foam Sequence I , 24 °c		
Foaming Tendency	Foaming volume in ml	
Foam Stability	Foamvolume in ml	
Foam Sequence II , 94° c		
Foaming Tendency	Foaming volume in ml	
Foam Stability	Foamvolume in ml	
Foam Sequence III, 94°c to 24° c		
Foaming Tendency	Foaming volume in ml	
Foam Stability	Foamvolume in ml	

Air Release Properties

Test	Unit	Current Sample
Air Release at 50 °c	Minutes :Second	

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