



Operations Checklist Braze Aluminum Heat Exchangers & Cold Boxes

January 2024

Braze Aluminum Heat Exchangers	
Tasks	Potential Issues
1. Check the temperature rates of change for all streams over the past 24 hours	<p>>60°C/hr: -Significant operational change occurred too quickly (startup, shutdown, change in operating mode, etc.)</p> <p>>5°C/min change: -Abrupt process change upstream of one or more streams.</p> <p>Rapid steady state oscillations >1°C/min: -Poorly tuned control valve -Unstable flow regime -Incorrectly sized control valve</p>
2. Check the stream temperature differences of headers that overlap along the length of the BAHX (i.e. headers located at the top, bottom, etc.)	>28°C: -Process deviation outside of intended design
3. Check max stream temperature	>65°C (higher for special applications)
4. Check the pressure drop across all streams of the exchanger	<p>High pressure drop: -Fouling/plugging (mole sieve, lube oil, hydrates, pipe scale, waxes, debris, CO2 freezing, etc.)</p> <p>Rapid pressure drop oscillations: -Poorly tuned control valve -Unstable flow regime -Incorrectly sized control valve</p>
5. Check max stream pressure	>MAWP for each individual stream
6. Check all strainer pressure drops	<p>High pressure drop: -Strainer is blocked with material</p> <p>Pressure drop decreases significantly with no apparent cause: -Strainer has become dislodged or damaged</p>
7. Check the compositions of stream inlets and outlets	<p>Composition difference between inlet & outlet: -2-phase flow affecting measurement accuracy -Internal cross pass leak</p>
8. Record normal operating procedures, any plant upsets, shutdowns, and any other operating conditions	<p>No records: -Prevents root cause determination if leak is detected</p>
9. Look for frost, venting, condensation, or liquid drainage from BAHX or from under insulation	<p>Frost, condensation, or drainage: -Inadequate, damaged, or loss of insulation -External leak</p> <p>Venting: -External leak</p>
10. Operate a gas detector in the ground area immediately around the BAHX	<p>LEL detected: -External leak</p>
11. If FLIR is available, check for unusual or abnormal cold spots	<p>Abnormal cold spots: -Inadequate, damaged, or loss of insulation -External leak</p>

Cold Boxes – Perform tasks 1-8 for all BAHXs in the Cold Box		
Tasks		Potential Issues
1.	Look for frost, condensation, or liquid drainage from the boots and the cold box walls	<i>Frost, condensation, or drainage:</i> -Leak of equipment or piping inside the cold box -Loss / settling of insulation
2.	Check for excess venting from breather valve	<i>Excess venting:</i> -Purge gas flow rate higher than design -Leak of equipment or piping inside the cold box
3.	Operate a gas detector in the ground area immediately around the cold box	<i>LEL detected:</i> -Leak in equipment or piping inside the cold box <i>Low oxygen detected:</i> -Leak in the cold box casing
4.	If a leak is suspected, monitor the gas out of the breather valve at the top of the cold box or by using sample ports (if available)	<i>LEL detected:</i> -Leak in equipment or piping inside the cold box
5.	Check the cold box casing and boots for cracks and corrosion; ensure boot fasteners are tight	<i>Damage:</i> -Excess loss of nitrogen purge gas -Ingress of water resulting in freezing -Loss of ability to hold an inert atmosphere
6.	Check the cold box casing pressure	<i>High pressure:</i> -Purge gas flow rate higher than design -Leak of equipment or piping inside the cold box <i>Low pressure:</i> -Leak in the cold box casing -Lower than required flow of nitrogen purge gas -Emergency vent cover has opened

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