TECHNICAL INFORMATION COMMUNICATION

Quality and Continuous Improvement

Number: TIC2021-0013 **Date:** 1/11/2022

Title: Capacitor Supplier Improvement

Product Category: Cooling Products

Products Affected

105ANA	124ANS	187BNC	226ANA	24ACB3	24ANB7	25HHA4	BA13	C4A3	CH14
113ANA	126BNA	214DNA	226CNA	24ACB7	24APB6	25HNB6	BA14	CA13	CH16
114CNA	126CNA	214DNC	24AAA5	24ACC4	25HBC5	25HPB6	BA15	CA14	CH17
114CNC	127ANA	215BNA	24ABB3	24ACC6	25HCB6	286BNA	BA16	CA15	CSA5
116BNA	186BNA	224ANS	24ABC6	24AHA4	25HCC5	286BNC	BA17	CA16	CSA6
123ANA	187BNA	225BNA	24ACA4	24ANB6	25HCE4	38CKM0	BH14	CA17	CSH4
							BH16	CCA7	CSH6
							BH17		

Situation

Customers reported low confidence in production capacitors stating they fail faster and more often that other options in the aftermarket.

Technical Information

Typical major causes of capacitor failures are heat, high voltage, humidity, chemical contamination, and moisture. The sealed design of the capacitor body and robust qualifications eliminate the last three causes. High voltage was improved with capacitor requirements changed to 440 volts from previous 370 volt in the last few years. This left heat as the catalyst of recent high failures and created a need to look carefully at our current qualifications and how heat affects the capacitor filler material.

Capacitors fail when hydrogen gas builds up to a level that deforms the canister. The hydrogen gas is created by the acids that are produced when the dielectric oil breaks down.

Current specifications call for capacitors to be capable of operating up to 70°C (158°F) for 60,000 hours. Testing was conducted at UL comparing all current capacitor production, RC supplied capacitors and some field suggested brands. All capacitors were tested to this 70°C value and passed. Testing was conducted to force failures above the current standard up to 150°C (302°F). Performance comparisons were made by analyzing time and temperature at failure.

The supplier currently provides a dielectric oil of caster oil (vegetable) that meets the 70°C qualification but breaks down above 85°C (185°F). This supplier provided capacitors with mineral oil

that will withstand up to 100°C (212°F) to test at the elevated temperatures. This will reduce the amount of acid production between 70-100°C, thus increasing the life of the capacitor.

The samples with the new improved oil showed similar temperature resistance as the highest performing brands tested.

The labels change as below: Black is current production with Caster Oil, New Production will be the blue ink label with Mineral Oil.

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Single capacitor

-40℃ to 70℃ label for castor oil type:

30μF ±6% CBB65
440VAC 50/60Hz SH
Castor Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CA440-30R-0
E187356 HC96DA030

-40℃ to 70℃ label for mineral oil type:

30μF ±6% CBB65
440VAC 50/60Hz SH
Mineral Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CA440-30R-0
E187356 HC96DA030

Dual capacitor

-40℃ to 70℃ label for castor oil type:

45/5μF ±6% CBB65B
370VAC 50/60Hz SH
Castor Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CD440-4505R-0
E187356 HC98KA046

-40℃ to 70℃ label for mineral oil type:

45/5μF ±6% CBB65B
370VAC 50/60Hz SH
Mineral Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CD440-4505R-0
E187356 HC98KA046

Oval capacitor

-40℃ to 70℃ label for castor oil type:

7.5μF ±6% CBB65-V
370VAC 50/60Hz SH
Castor Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CA370-07V-0
E187356 HC91CA007

-40℃ to 70℃ label for mineral oil type:

7.5μF ±6% CBB65-V
370VAC 50/60Hz SH
Mineral Oil Protected 10,000AFC
Characteristic E -40℃ to 70℃
No-PCB CA370-07V-0
E187356 HC91CA007

Only trained and qualified personnel should design, install, repair and service HVAC systems and equipment. All national standards and safety codes must be followed when designing, installing, repairing and servicing HVAC systems and equipment. It is the responsibility of the Dealer to ensure local codes, standards, and ordinances are met.

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Interim Corrective Action

The mineral oil capacitor was rolled into production Q3 2020 and can be identified by the blue labels as shown above.
RC supply was not affected by this change.

Permanent Corrective Action

Update the current supplier qualifications to require operational range to 90°C, which will have no visible change to production capacitor beyond that specified above for interim corrective action.