ARVP offers solution to fridge fires

July 20, 2017 in RV Industry News 8 Comments

BUTTE, Mont. — RV refrigerator fires have been a perennial problem for RV owners for many years and an expensive issue for RV manufacturers, refrigerator makers and insurance companies.

One class action lawsuit against Norcold was settled via a payout of $36 million. Another active class action suit against Dometic is still winding its way through the courts. But, that complaint suggests that RV refrigerator fires have caused more than $100 million in property damage since 1997.

Paul Unmack, an engineer by trade, has developed a device that he says will end RV refrigerator fires, given that the cooling units are made properly. This is done by shutting off the devices when the cooling unit boiler temperatures exceed approximately 400 degrees Fahrenheit.

“RV absorption refrigerators are exceedingly reliable instruments when operated and manufactured correctly,” he told RV Daily Report.

He has produced a series of videos that describes how absorption refrigerators work. They can be seen found at the ARPRV website.

His solution is a simple device that monitors temperatures on the refrigerator’s boiler assembly and the flow of fluids through the device. Fluids are essential to making the refrigerator work. In a nutshell, here’s how the system works.

Ammonia is absorbed into water, which makes it the perfect refrigerant, he explained.

“Ammonia boils at -36 degrees Fahrenheit and is an environmentally safe refrigerant. Ammonia is natural in the environment, a byproduct of decomposition of organic materials that releases no greenhouse gases,” said Unmack.

The ammonia-water solution is extracted from a reservoir and pumped to a boiler. As the mixture boils, the endothermic process allows the ammonia gas to separate from the water. The gas travels up the tubes to a condenser while the water falls back to a reservoir.

Then, in an exothermic process, the condenser liquefies the pure ammonia. The pure ammonia enters the evaporator where the ammonia absorbs heat from within the refrigerator compartments, which in turn cools the compartments.

The refrigeration process is completed when the ammonia gas is once again absorbed back into the water in the absorber coils. The solution travels back to the reservoir where the refrigeration cycle continues until the desired cooling level is attained.

However, the system must remain level in order to function properly. Something as simple as a 6 percent grade can allow all fluids in the boiler to overheat in six minutes and begin damaging the refrigerator components, said Unmack.

That's less time than it often takes to go up or down a mountain. In fact, Unmack has spoken to several RVers who have destroyed their refrigerators by keeping them on while traveling through the mountains.

Another common way to destroy an RV fridge is to get a flat tire or have the RV towed, the owner is not thinking of turning off the fridge while the RV is off-level, they are thinking of solving their immediate problems.

"It is also critically important that RV owners ensure their RVs are level at campsites," he explained. "It is reported that refrigerators are the No. 2 fire claim to insurance companies each year. One RV repair center told me that only drive train and engine problems rank higher for repairs than refrigerators."

Because refrigerator cooling units are self-contained, no water or gas can be added to the system after it has been built without specialized equipment. The refrigerators are designed to work continuously unless something interferes with the process.

The Unmack's have absorption type refrigerators made in 1937 that work to this day without repairs or failures "This proves how reliable absorption refrigerators are if made correctly and the boiler is not allowed to overheat," he explained.

The big problem develops when pipes burst under pressure. So, how does that happen?

Included in the ammonia and water mixture is a chemical called sodium chromate, which is used as a corrosion inhibitor. Without it, the ammonia constantly running through the system would attack the steel pipes in a refrigerator.

So, as long as the RV is level and the gas and water mixture can circulate as the system is designed, there won't be a problem. But, if the RV is not level and the refrigerator is being used, it can cause the ammonia to pool in one area.

"It is critical that the ammonia return to the boiler as described, this is because the ammonia boiling is the only thing that regulates the boiler temperature," he explained. "If the boiler temperature is not regulated, the rust inhibitor in the system is destroyed resulting in the break down of the steel causing pock marks of corrosion to develop in the pipes."

Overtime, those pockets can develop into cracks and once a crack makes its way through the pipe, the gas can escape and explode, causing the refrigerator to catch fire. The system basically corrodes from the inside out and the area of greatest weakness is always at the point the steel is welded, said Unmack.

He compared the process to something that Boy Scouts often learn to do, which is boil eggs in paper cups. As long as there is water in the cup, fire will not consume it. But, when the water boils out and there is no fluid left to cool the paper, it disintegrates.

"When the system is level, the refrigerator holds a constant temperature while it is running," he explained. "However, when it goes off level, the ammonia pools in the system to the point it can't make its way back to the boiler. The exterior temperature begins to rise as does pressure in the pipes."

Water expands 1,600 times as it changes from liquid to vapor – dramatically increasing pressure inside the system, he added. Unmack's patented controller will prevent the water in the system from boiling which in turn preserves the sodium chromate rust inhibitor.

Unmack developed a device called the Absorption Refrigeration Protective (ARP) Controller that not only monitors the temperature of the boiler, but also monitors the flow of material through the system. When it detects the temperature exceeding levels required for the system to operate, it shuts down the refrigerator and allows the mixture to cool before automatically restarting in a set amount of time.

After five successive shutdowns, it turns the refrigerator off and warns the owner, who has to manually reset the controller.

"It is very rare for a fridge to overheat five times in a row," he said. "The RV would have to park off-level for three to five hours for this to happen."

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I have a Norcold 1201 with their recall sensor. The sensor i...

Unmack demonstrated his solution at the Family Motor Coach Association convention last year in Madison, Wisconsin. He sold hundreds of units to RV owners who could appreciate the value of his solution once they understand how the problems can occur.

“The RV industry has not embraced our product because everyone knows that refrigerator issues are the No. 2 reason for having RVs repaired,” he explained. “Which option would RV dealers prefer? Installing a $135 part or replacing a $1,500 to $5,000 refrigerator?

“Dometic and Norcold should be knocking down our door to install these devices, rather than knocking us down by telling people our system is not necessary,” said Unmack.

After reading information about the Norcold recall, he discovered that the refrigerators are programmed to shut off at 800 degrees – well beyond the point any fluid is left in the system, he explained. Not only that, but once the system is shut off, it is permanent. The RV owner either has to reset the recall box or take the fridge to an RV tech and have the recall replaced.

“Our system will shut down at the first sign of a problem, then automatically restart five times. If the problem still exists, it will shut down and alert the owner who needs to manually reset the controller,” said Unmack. “By telling the owner there is a problem with the system, it also gives the owner an opportunity to better level the RV to ensure that the system works as designed.”

For more information on the Absorption Refrigeration Protective (ARP) Controller, visit www.arprv.com.

Tagged with: ARVRP PAUL UNMACK

About Greg Gerber

Greg Gerber is a freelance writer and podcaster who has been writing about the RV industry since 2000. He is the former editor of RV Daily Report and can be reached at greg@rvdailyreport.com.

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John, you are right on. Quality and service...non existent i...

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Jeff, I am a new born free follower. I just bought my first...

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8 comments

Sandy Swede
July 21, 2017 at 5:55 pm

I had one of these ARP devices installed shortly after I bought our new to us Newmar DP. If you have a Norcold or Dometic fridge, you are courting disaster if you don't get an ARP thermal limit switch installed, IMHO. Paul (owner of ARP) personally spent a couple of hours to correct a poor installation by a so-called RV Tech where we live on the east coast. If you hire an RV place to install the ARP, send Paul a photo of the wiring to make sure it was done correctly.

Reply

Sandy Swede
July 22, 2017 at 9:13 pm

Update to 7/21/17 post by Sandy Swede:

I should have pointed out that materials found on the ARP RV website should be consulted first prior to sending photos to Paul (owner), should there be an issue with installation & operation.

Please see website for more information, troubleshooting, latest documents, and downloads.

MANUALS DOWNLOAD & VIDEO OPERATION MANUALS

Please go to

https://www.ARPrv.com

Reply

Brett Wolfe
July 22, 2017 at 9:54 am

I would not have an absorption refrigerator without an ARP controller.

Brett Wolfe
Chairman FMCA Technical Advisory Committee

Reply

JDW
July 23, 2017 at 12:17 pm

I have one – as yet uninstalled due the several very confusing instructions. One set on the website seems to contradict another elsewhere on the site and quite possibly why Sandy Swede had a poor dealership installation. ARP needs to revisit their several different sets of instructions and links and come up with, if nothing else, one decent schematic for each basic NorCold and another for Dometic line and/or fridge specific sheets. Yes, I'll get ours installed in a week or so, but …..

Reply

Brad W.
July 23, 2017 at 9:35 pm

Personally, I sleep a lot easier knowing that my fridge is protected so I don't feel that I have to obsess quite so much about getting my RV perfectly level.

I've been using ARP since the early version 1.x model.
Just finished installing my second unit recently, a version 3.1+ in a Norcold N611

JDW, what type of fridge do you own? You might try calling or emailing Paul at ARP. I have found him to be extremely responsive and helpful.

I've spent quite a bit of time on the ARPRV.com site. Paul has a wealth of information there, covering seemingly all of the many variations of all the different models, as well as tons of reference material regarding these fridges and their function. It can be a bit overwhelming at first look for sure, but once i found my way to the correct installation and user manuals for my fridge I found it very thorough and straightforward.

The wires are all color coded. The hardest part of the installation for me was getting good solid crimps on the small wire!

Reply

Brad W.
July 25, 2017 at 8:18 am

JDW, I was thinking about your issue….
this page does a pretty good job of explaining what the ARP is doing
and the video at the bottom seems to explain the wiring well in my thinking. maybe this will help!
https://www.arprv.com/how-to-wire-dometic-or-norcold.php

There are a lot of different models and variations. I found that for my model it made sense looking at the various pictures in the ARP manual, and thankfully mine was very simple, but if you're having difficulty figuring out which one you have, I'll bet if you sent Paul a photo by email he'd be able to help point you to exactly which method to use.

Reply

Mark N
July 25, 2017 at 4:35 pm

The ARP is a simple solution to a significant problem; the fact that off-level operation can kill your fridge. With a small class-C motorhome, I always used to worry if I was level enough. The ARP ends that worry. For me, it's a no-brainer; there will always be an ARP on any absorption fridge I own.

Mark Nemeth
Escapees Tech. Advisor

Reply

Glenn Seay
August 3, 2017 at 9:37 am

I have a Norcold 1201 with their recall sensor. The sensor is in a failed state(red light) after washing down the RV. Possible over spray! I have tried all techniques to reset or isolate the problem. The relay kicks in when 12v applied and then drops out too a fail light, no 12v out. I have jumped the 12v in(red) to the 12v out(Blu), refreg does not come on but control lights on freg do. I placed a 5 amp fuse in line in case of further problems, no problems, fuse fine. I can hear a slit buzzing from the Control box so I discontinued hot test. I checked Control Box Fuses F1 & F2 they are good. I am tring to deduct if the Recall Sensor is the problem or is the Control Brd. the problem or the Refr. I think the Sensor is OK, not sure on the Control Brd.. There are no spills or smells! I have tried with Generator, same problem??? Any directions to take would be greatly appreciated!

Reply

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