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United States Court of Appeals  
Tenth Circuit

**UNITED STATES COURT OF APPEALS**  
**TENTH CIRCUIT**

**FEB 25 2004**

**PATRICK FISHER**

**Clerk**

TRUCK INSURANCE EXCHANGE, a  
Farmers Insurance Company,

Plaintiff-Appellant,

v.

MAGNETEK, INCORPORATED,

Defendant-Appellee.

No. 03-1026

**APPEAL FROM THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLORADO  
(D.C. NO. 00-RB-2218 (CBS))**

Clifton J. Latiolais, Jr. (Colin C. Campbell with him on the briefs) Campbell, Latiolais & Ruebel, P.C., Denver, Colorado, for Plaintiff-Appellant Truck Insurance Exchange.

Brent D. Anderson, Snell & Wilmer, LLP, Denver, Colorado, for Defendant-Appellee MagneTek, Incorporated.

Before **EBEL, BRISCOE, and TYMKOVICH**, Circuit Judges.

**TYMKOVICH**, Circuit Judge.

On November 9, 1998, a fire destroyed Sammy's Restaurant in Lakewood, Colorado. In this subrogation case, plaintiff Truck Insurance Exchange claims that a fluorescent light ballast manufactured by defendant MagneTek, Incorporated, caused the

fire, and seeks to recover over \$1.5 million paid out to Sammy's. The district court's jurisdiction was based on diversity between Truck, a California corporation, and MagneTek, a Delaware corporation with its principal place of business in Tennessee. *See* 28 U.S.C. §§ 1332, 1446. We have jurisdiction on appeal pursuant to 28 U.S.C. § 1291.

Following the completion of discovery, MagneTek moved to exclude certain opinion testimony of Truck's experts under *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). The district court granted MagneTek's *Daubert* motions in part, finding that the experts' conclusions about the cause of the fire were not based on a sufficiently reliable scientific theory. The district court then ruled that without such expert testimony a rational trier of fact could not find for Truck, and granted summary judgment in favor of MagneTek.

Truck appeals both of these decisions and we affirm.

#### Background

The afternoon of November 9, 1998, crews from the West Metro Fire Protection District responded to a report of smoke coming from Sammy's Restaurant. When firemen arrived at the restaurant they encountered heavy smoke, but no open flames. The firemen could not locate the source of the smoke until the fire broke through the kitchen floor and the ceiling of the storage area below. The fire then quickly spread and destroyed the building.

Investigators from the West Metro Fire Protection District and Phoenix Investigations, a private fire inspection company hired by Truck, performed the initial investigation of the fire. They began by sifting through the fire debris to identify burn patterns and other evidence of the fire's origin and cause. The investigators concluded that the fire started in the void space between the basement storeroom ceiling and the kitchen floor.

Amongst the debris in the basement, the investigators found a fluorescent light fixture that had been mounted to the storeroom ceiling. Three investigators, Lt. Dan

Pfannenstiel of the West Metro Fire Protection District, and Thomas McAdam and George Hodge of Phoenix Investigations, concluded that the light fixture somehow started the fire because there were no other apparent heat sources in the area of the fire's origin.<sup>1</sup> Knowing that fluorescent light fixtures contain a component called a "ballast" that is designed to control the amount of heat the fixture can generate, the investigators then focused on the ballast as a likely cause of the fire.

After their initial examination, Pfannenstiel and McAdam turned the fixture over to Hodge of Phoenix Investigations and Dr. Joe Romig of Ponderosa Associates, another investigation firm hired by Truck, for further analysis. Hodge disassembled the fixture and examined the various parts of the ballast in an effort to determine both its manufacturer and whether it had in fact overheated. Eventually, these analysts determined that the ballast had been manufactured by MagneTek. They also observed oxidation patterns on the fixture and discoloration of the ballast's heating coils that suggested the ballast had shorted, causing internal overheating prior to the external fire.

The ballast contained a device called a thermal protector, which is designed to shut off power running through the fixture if the temperature exceeds 232 Fahrenheit, well below the approximately 400 F generally believed to be the minimum temperature necessary to ignite wood. Once the temperature falls sufficiently, the thermal protector restores power. Both parties agree that the thermal protector in the ballast from Sammy's continued to function properly even after the fire.

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<sup>1</sup> Electrical wiring also ran through the void area, but the investigators did not see any evidence of electrical short or other malfunction and dismissed the wiring as a potential cause of the fire. MagneTek points out that by the time it became involved in this litigation all the physical evidence from the scene, other than the light fixture, had been destroyed.

Because they had eliminated any other heat source, Truck's experts remained convinced that the ballast was the likely cause of the fire. They therefore began to study how the ballast might have started a fire in spite of the functioning thermal protector.

Truck's experts conducted a series of simulations, at least one of which showed that a shorted "exemplar" (or test) ballast of a type similar to that found at Sammy's reached temperatures of 340 before the thermal protector began to cycle on and off. The test ballast eventually reached stable temperatures over 300 .

Though both this peak temperature and the stable temperature are significantly below normal wood ignition temperature, Romig proposed to testify that this level of overheating was sufficient to have caused the Sammy's fire. Romig based his conclusion that the shorted ballast could have and, in his opinion, did start the fire on a theory called "pyrolysis," which posits that wood can catch fire at temperatures below 400 if it is exposed to such temperatures over a long enough period of time.<sup>2</sup> Pfannenstiel's testimony likewise would have been that in his opinion the ballast caused the fire. His opinion was based not on scientific theory, but on his experience as an investigator and his having eliminated any other possible heat source as a cause.

MagneTek, disagreeing that pyrolysis could be relied upon to explain the start of the fire, and further disagreeing that the evidence supported the conclusion that there was no other possible source of the fire, moved to exclude the opinions of both Romig and Pfannenstiel and for summary judgment. Applying *Daubert* and its progeny, the trial court granted these motions to the extent the experts expressed opinions about the actual

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<sup>2</sup> We note that there appears to be some confusion among the parties, the district court, and apparently even the scientific community as to the proper terminology for the theory of long-term, low-temperature wood ignition and the charring it involves. This court is not in a position to decide such questions for the scientific community, but for the purposes of this opinion, we will refer to this *process* as "pyrolysis." To the extent we use the term "pyrophoric carbon," we are talking about the *substance* charred wood.

cause of the fire.<sup>3</sup> The end result was that Truck had no expert testimony showing that the ballast could have reached temperatures approaching 400 or that wood can catch fire below that temperature. The court then concluded that without any such evidence, Truck could not establish causation, an essential element of all its claims, and granted MagneTek's motion for summary judgment.

### Discussion

#### I. Exclusion of Expert Testimony

Rule 702 of the Federal Rules of Evidence states:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Fed. R. Evid. 702. The Supreme Court has laid out a framework for analyzing proffered expert testimony in the so-called *Daubert* trilogy, which consists of *Daubert*, *General Electric Co. v. Joiner*, 522 U.S. 136 (1997), and *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137 (1999).

Analysis under *Daubert* is intended to ensure that the evidence is both "reliable" and "relevant." *See* 509 U.S. at 589. In this case, the district court addressed only the first of these requirements, and found that the conclusions of Dr. Romig and Lt. Pfannenstiel were not sufficiently reliable.

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<sup>3</sup> MagneTek's motions also sought to exclude other expert testimony, which the trial court granted in part. On appeal, however, Truck has only asked us to reverse the court's decisions as to Romig and Pfannenstiel.

To determine the reliability of expert testimony, courts assess “whether the reasoning or methodology underlying the testimony is scientifically valid.” *Daubert*, 509 U.S. at 592-93. In *Daubert*, the Court listed four factors that, while not an exclusive list of considerations for a trial court, will often be important in making this assessment: (1) whether the opinion has been subjected to testing or is susceptible of such testing; (2) whether the opinion has been subjected to publication and peer review; (3) whether the methodology used has standards controlling its use and known rate of error; (4) whether the theory has been accepted in the scientific community. *See id.* at 590.

We have summarized the burden of the plaintiff to show the reliability of proffered expert opinions this way:  
The plaintiff need not prove that the expert is undisputedly correct or that the expert’s theory is “generally accepted” in the scientific community. Instead, the plaintiff must show that the method employed by the expert in reaching the conclusion is scientifically sound and that the opinion is based on facts which sufficiently satisfy Rule 702’s reliability requirements.

*Mitchell v. Gencorp Inc.*, 165 F.3d 778, 781 (10th Cir. 1999) (citations omitted).

We review the district court’s application of *Daubert* to exclude expert testimony for abuse of discretion. *See Joiner*, 522 U.S. at 143; *Mitchell*, 165 F.3d at 780. The trial court is afforded substantial deference in its application of *Daubert*. *See Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1204 (10th Cir. 2002) (citing *Kumho Tire*, 526 U.S. at 1152). Therefore we will only disturb the trial court’s decision if we have “a definite and firm conviction that the lower court made a clear error of judgment or exceeded the bounds of permissible choice in the circumstances.” *United States v. Ortiz*, 804 F.2d 1161, 1164 n.2 (10th Cir. 1986).<sup>4</sup>

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<sup>4</sup> This court recently outlined the minimal gatekeeping role required of trial courts under the *Daubert* trilogy in *Dodge v. Cotter Corp.*, 328 F.3d 1212 (10th Cir. 2003). The extensive review of the proposed testimony, scientific materials, and other evidence reflected in the record and summarized in the court’s various orders regarding expert testimony show that the court fulfilled this gatekeeping role.

*Dr. Romig*

Dr. Romig has advanced degrees in physics from Oxford University and the University of Colorado and has been studying the causes of fires and explosions for over 20 years. There is no question he is qualified to testify as an expert under Rule 702. Nor is there any question that his opinion as to the cause of the Sammy's fire would have been relevant. After reviewing the reliability requirements of the *Daubert* trilogy, however, the district court concluded that "the hypothesis for long term, low temperature ignition of wood cannot be considered to be a reliable basis for the admission of expert opinion testimony under Rule 702." The court therefore granted MagneTek's motion to strike "as to testimony by Romig that the fluorescent light ballast at issue in this case caused the fire which is the basis for the plaintiff's claims."

The district court accurately summarized the relevant struck testimony by Romig as follows:

Romig's most crucial opinion in this case is his opinion that heat from the ballast, varying between 180 and 300 degrees Fahrenheit, was sufficient to cause one of the furring strips in the ceiling to catch on fire. Romig would testify that this long term heating of the ceiling and the furring strips caused the formation of so-called pyrophoric carbon or activated carbon in a furring strip. According to Romig, with the formation of pyrophoric carbon, and given otherwise proper conditions, ignition of wood can occur when the wood is exposed to long term heating within the temperature ranges he says the MagneTek ballast produced. Such carbon is said to "self-heat" and thus may cause a fire. This type of ignition, Romig would testify, most likely caused the fire at Sammy's Restaurant.

App. at 28-29 (internal citations to depositions and exhibits omitted). The district court gave two alternative reasons for its decision to exclude this testimony, finding both that the long-term, low-temperature ignition theory was unreliable, and that it had not been reliably applied to the facts of this case. Because we find that the court did not abuse its discretion in finding that the testimony was not "the product of reliable principles and

methods,” we need not address whether it was or could be reliably applied.<sup>5</sup> See Fed. R. Evid. 702; *Mitchell*, 165 F.3d at 781.

Truck introduced three publications to support the pyrolysis theory underpinning Romig’s opinion. As the district court noted, all three do indeed posit that pyrolysis could explain the origin of some fires. The district court was also correct, however, when it found that all three cast doubt on the general scientific acceptance, the methodology, and the adequacy of the experimentation underlying pyrolysis at this time. It was therefore within the district court’s discretion to reject the theory as insufficiently reliable to form the basis of expert testimony.

The first article discussed, by John D. DeHaan, reviews two studies that concluded that wood heated to temperatures below 250 could, over “a period of years” or a “very long time,” degrade into charcoal, which would eventually ignite. The district court, however, found that both studies gave “only vague parameters” to the conditions required for such an event to occur, and that neither described testing that could have specified those conditions.

The second article, by Vytenis Babrauskas, is even more dubious as a foundation for pyrolysis.<sup>6</sup> The Babrauskas article discusses the same materials reviewed by DeHaan, and notes an additional study that found that wood exposed “for a few years” to temperatures between 120 and 150 Celsius (250 -300 Fahrenheit) would char. It also

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<sup>5</sup> We do note, however, that Truck failed to introduce evidence of actual experiments conducted by its experts showing that furring strips attached in a ceiling to 5/8 inch gypsum board that held a light fixture, as at Sammy’s, could ignite at low temperatures due to pyrolysis. Truck consequently failed to address the points raised by the district court in its alternative ruling that pyrolysis had not been reliably applied, including the role played by the size of the wood in question and the flow of oxygen to it and the dissipation of heat as it flowed from the ballast through the intermediate materials, such as metal and drywall, to the wood that allegedly ignited.

<sup>6</sup> We note, though Truck chose not to, that the title of this article is “Pyrophoric Carbon: The Jury Is Still Out.”

states that other studies “have done nothing to disprove the possibility of long-term, low-temperature ignitions of wood.” Babrauskas goes on, however, to list “[a] number of things not known about the process,” and to state that the question, “while unsolved now, can be solved. It may be many decades before it will be solved by sufficiently improving theory.” Also, the studies showing low temperature charring do not find actual ignition of the charred wood. The article concludes that “the phenomenon of long-term, low-temperature ignition of wood has neither been proven nor successfully disproven at this time.”

The final article relied on by Truck, by Bernard R. Cuzzillo and Patrick J. Pagni, is generally supportive of the theory of pyrolysis, and describes one experiment in which an 8-inch cube of solid wood caught fire after nine days in an oven heated to 392 F. The district court noted that Cuzzillo and Pagni, however, did not cite any testing of wood at temperatures closer to the 300-340 at issue in this case. Furthermore, Cuzzillo and Pagni themselves highlight unanswered questions about the interaction of important factors such as “[s]ize, shape, temperature and material characteristics,” and state that “[t]he time needed to adequately cook wood to the point of uninhibited self-heating at different temperatures is not well known.”

Romig himself underscored the scientific uncertainty about the pyrolytic process. During his deposition he stated that the process “depends on a lot of factors, as yet quantitatively unidentified.” He later acknowledged that to understand how the furring strips could ignite at low temperatures, “[y]ou would have to have a good theory of pyrophoric carbon and formation and the chemical kinetics of that; and there isn’t one, as Babrauskas points out.”

Surveying this evidence, the district court concluded that “when considering the temperatures at issue here, the long term, low temperature ignition of wood is an hypothesis which has not been subjected to sufficient testing. Without such testing, there are few if any reliable principles about the phenomenon and methods to determine when

the phenomenon might occur.” The court therefore ruled that the hypothesis could not be considered “a reliable basis for the admission of expert testimony under Rule 702.”

Given the cautionary statements about the reliability and foundation of pyrolysis from the authors of the articles offered by Truck and from Truck’s own expert, we cannot conclude that the district court abused its discretion in excluding Dr. Romig’s opinion testimony.<sup>7</sup> We are faced with a situation similar to that in *Mitchell*, where this court held that “the analytical gaps in [the experts’] opinions are too broad for their testimony to endure under the strictures of *Daubert* and Rule 702.” *Mitchell*, 165 F.3d at 783. As in *Mitchell*, several of the *Daubert* Court’s non-dispositive factors support the district court’s decision, including the insufficient testing cited by the district court, as well as a lack of evidence showing how Dr. Romig’s opinion could be tested and his theory’s applicable rate of error, and questions about the theory in the scientific community. *See Mitchell*, 165 F.3d at 784. The district court therefore did not abuse its discretion when it ruled that under the *Daubert* trilogy, pyrolysis was not yet a sufficiently reliable scientific theory upon which to base an expert opinion about the cause of the Sammy’s fire. *See* 509 U.S. at 592-93.

*Lt. Pfannenstiel*

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<sup>7</sup> Truck argues that MagneTek cannot contest the validity of the pyrolysis theory because MagneTek’s own expert admitted its reliability. Even to the extent MagneTek’s experts did accept that pyrolysis is the subject of scientific study, we note that they too expressed doubts about the theory’s reliability, approvingly referring to the title of the Babrauskas article. More importantly, however, the district court’s gatekeeper role requires it to examine the basis for challenged expert testimony to determine its reliability looking beyond the testimony of the witnesses before it to the scientific foundation for that testimony. *See Dodge*, 328 F.3d at 1221-22. To the extent MagneTek’s experts acknowledged Romig’s theory in general, the contrary evidence examined by the trial court and summarized above remains strong enough to convince us that the trial court did not “exceed the bounds of permissible choice in the circumstances.” *See Beaird v Seagate Tech, Inc.*, 145 F.3d 1159, 1164 (10th Cir. 1998).

Lt. Dan Pfannenstiel is an investigator with the West Metro Fire Protection District. He, along with Thomas McAdam of Phoenix Investigations, initially investigated the Sammy's fire and offered testimony on behalf of Truck detailing their findings, as well as expert opinions about the origin and cause of the fire. Pfannenstiel and McAdam concluded that the fire started in the void between the basement ceiling and the kitchen floor, and that the light fixture was both located in the area of ignition and was the only potential source of ignition in the area. They further offered their opinions that the ballast was in fact the cause of the fire. The district court struck both Pfannenstiel's and McAdams's opinion testimony about the ballast.

Truck has appealed only the district court's striking of Pfannenstiel's testimony. As with Dr. Romig, Pfannenstiel's status as an expert and the relevance of his proffered opinion are not in question. The only issue, again, is "whether the reasoning or methodology underlying the testimony is scientifically valid." *Daubert*, 509 U.S. at 592-93.

In its order, the district court stated that the opinion that the ballast caused the fire was not admissible under Rule 702 because Pfannenstiel did not have "any evidence that the ballast could generate enough heat to ignite combustibles in the ceiling." His conclusion therefore "cannot be said to be based on reliable principles and methods. Rather, th[is] opinion[ is] based on assumptions and speculation." We find no abuse of discretion in this ruling.

The district court noted that Pfannenstiel's opinion did not meet the standards of fire investigation Pfannenstiel himself professed he adhered to. According to Pfannenstiel, those standards require that an investigator who suspects an appliance may have started a fire first determine the ignition temperature for the fuel, then determine whether the heat source was capable of generating that temperature. The discussion above regarding Romig's testimony shows that Pfannenstiel's opinion regarding the first prong of the analysis – the ignition temperature – could not be based on the pyrolysis

theory of low-temperature ignition. The only evidence Pfannenstiel or the court had about the second prong – the temperature of the ballast – showed in post-fire testing that the ballast could not have reached the temperatures necessary to ignite it under any other theory.

In reaching his conclusion that the ballast started the fire, therefore, Pfannenstiel either was relying on the pyrolysis theory the district court found unreliable, or he was making assumptions about the temperature of the ballast that were not supported by the evidence. In either case, the district court was within its discretion in not admitting Pfannenstiel's opinion that the ballast was the cause of the fire.

## II. Summary Judgment

Truck maintains that even without the excluded expert opinions identifying the ballast as the cause of the fire, the court nevertheless erred in granting summary judgment to MagneTek. We review the grant of summary judgment de novo, applying the same standard as the district court. *Simms v. Oklahoma ex rel. Dep't of Mental Health & Substance Abuse Servs.*, 165 F.3d 1321, 1326 (10th Cir. 1999). Summary judgment is appropriate “if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law.” Fed. R. Civ. P. 56(c). “When applying this standard, we view the evidence and draw reasonable inferences therefrom in the light most favorable to the nonmoving party.” *Simms*, 165 F.3d at 1326. The nonmoving party, Truck, must nonetheless present “facts such that a reasonable jury could find in [its] favor.” *Id.*

Truck argues that the evidence it introduced was sufficient to present a prima facie case under Colorado law.<sup>8</sup> Truck's complaint asserted four claims against MagneTek: (1)

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<sup>8</sup> In this diversity case, we apply the substantive law of Colorado. See *Erie R.R. v. Tompkins*, 304 U.S. 64 (1938); *Habermehl v. Potter*, 153 F.3d 1137, 1139 (10th Cir. 1998).

strict products liability based on a defective design; (2) negligent design; (3) breach of implied warranty of merchantability; and (4) breach of implied warranty of fitness for a particular purpose. Though the elements of these claims vary, one constant is the need for the plaintiff to prove causation. *See* Colorado Jury Instructions Civil 4th (2001) §§ 14:1 (strict liability), 14:10 (warranty of merchantability), 14:13 (warranty of fitness for a particular purpose), 14:17 (negligence).

The district court ruled that Truck failed to create a genuine dispute as to whether the ballast could have reached the temperatures necessary to start the fire. The court found that question is beyond the experience of the average layperson, and therefore that expert testimony was required to prove causation. This was within the court's discretion. *See Oliver v. Amity Mut. Irrigation Co.*, 994 P.2d 495, 497 (Colo. Ct. App. 1999). Because the court had already stricken all expert testimony relating to pyrolysis, it ruled that Truck had failed to provide evidence that would permit a rational trier of fact to find that the MagneTek ballast caused the fire, and thus granted summary judgment on all four of Truck's claims.

Truck argues that it did not need the excluded expert testimony to present sufficient evidence of causation. It claims that jurors could draw from the other available evidence a "reasonable inference" that the ballast caused the fire. Truck quotes our decision in *Weir v. Federal Ins. Co.*, where we said, "An inference need not be justified beyond all doubt and is not precluded by a mere possibility that the contrary may be true." 811 F.2d 1387, 1392 (10th Cir. 1987) (quoting *Fain v. GTE Sylvania, Inc.*, 652 S.W.2d 163 (Mo. Ct. App. 1983)). Initially, we note that *Weir* and the other cases Truck cites for this proposition relate to the basis for proof of a defect, not for proof of causation. *See, e.g., Werth v. Makita Elec. Works, Ltd.*, 950 F.2d 643 (10th Cir. 1991); *Union Ins. Co. v. RCA Corp.*, 724 P.2d 80 (Colo. Ct. App. 1986). To the extent those cases discuss a plaintiff's need to use circumstantial evidence and inferences to prove a

defect in a product that has been destroyed, they are inapposite, as the product at issue here – the ballast – was recovered from the fire and subjected to testing.

Nevertheless, Truck is correct that causation may also be inferred by a jury if the plaintiff has provided evidence that would make the inference reasonable. In this case, however, we agree with the district court that without the excluded expert testimony regarding pyrolysis, a jury could not reasonably make the necessary inference that the ballast caused the fire.

Viewing the evidence in the light most favorable to Truck, a rational jury could find the following facts about the cause of the fire: (1) The fire started in the void area below the kitchen floor and above the storage room ceiling; (2) the fluorescent light fixture was affixed to the ceiling in the area where the fire started; (3) the ballast shorted; (4) due to the short, the ballast allowed the fixture to overheat despite the presence of a functioning thermal protector; (5) the maximum temperature the ballast could have reached was 340 .<sup>9</sup>

The problem for Truck is a sixth fact, which Truck could not contest without relying on pyrolysis: Wood normally will not catch fire until exposed to a heat source of nearly 400 . The district court correctly ruled that the ignition temperature of wood is beyond the experience and understanding of the average layman. That fact then must be proven by expert testimony in circumstances where there is no flame or other heat source

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<sup>9</sup> This assumes, as it must given our standard of review of a grant of summary judgment, *see Simms*, 165 F.3d at 1326, that the jury ignored various arguments by MagneTek, including that electrical wiring in the void might have caused the fire, that the discoloration of the ballast was not in fact evidence of a short, that the ballast would not have actually approached the 340 claimed by Truck, and that any heat from the ballast would have been dissipated by the eight-foot light fixture, the ceiling material, and the air in the void space. It also does not take into account the fact that any heat created by the ballast would be dissipated as it flowed from the ballast to the metal casing of the fixture, through the 5/8 inch gypsum board ceiling, and into the wood furring strips that caught fire, as Truck alleges.

approaching 400 . *See* Fed. R. Civ. P. 702. Without the excluded expert testimony discussing pyrolysis, the only evidence about the required ignition temperature was that wood will only catch fire at approximately 400 and above. This leaves a gap of over 50 between the maximum possible temperature of the ballast here and the minimum possible temperature of ignition. Without pyrolysis, Truck could not bridge that gap.<sup>10</sup>

Truck focuses on arguing that circumstantial evidence may be used to prove causation. Again, we do not disagree with that general proposition. But before a plaintiff can rely on circumstantial evidence or the process of elimination Truck urges on us here, the plaintiff must at least present evidence to show why the defendant’s product should not be among the possible causes to be eliminated. *See, e.g., Hollander v. Sandoz Pharm. Co.*, 289 F.3d 1193, 1211 (10th Cir. 2002) (requiring plaintiffs’ experts to “rule in” the defendant’s drug “as a scientifically plausible cause”); *Franklin v. Skelly Oil Co.*, 141 F.2d 568, 570-71 (10th Cir. 1944) (“It is not sufficient to show a set of circumstances bringing the theory of appellants within the realm of possibilities . . .”); *Kaiser Found. Health Plan v. Sharp*, 741 P.2d 714, 719 (Colo. 1987) (en banc) (“[T]he plaintiff must establish causation beyond mere possibility or speculation.”).<sup>11</sup>

In this case, we agree with Lt. Pfannenstiel that in order to conclude that an appliance like the MagneTek ballast caused a fire, not only must one find that the appliance was in the area of origin, but “you need to show whether or not that appliance is capable of producing . . . enough heat to be a competent ignition source.” The only

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<sup>10</sup> Indeed, Dr. Romig’s deposition testimony shows that he did not think there was any “viable source of ignition” that did not involve the pyrolytic process.

<sup>11</sup> Requiring Truck to show that the ballast was capable of causing the harm of which they complain conforms not only with the established law of Colorado and this circuit, but with the investigatory standards of the National Fire Protection Association, *see NFPA Guide for Fire and Explosion Investigation* 921 § 18-4.1 (“Before it can be concluded that a particular appliance has caused the fire, it should first be established how the appliance generated sufficient heat energy to cause ignition.”).

admissible evidence in this case showed that the ballast's maximum temperature would have been approximately 50 below that required to start a fire.

Any fact finder that found in Truck's favor on the issue of causation would thus have had to either rely on the pyrolysis theory or believe that the ballast temperature approached 400 . A jury that took the first path would be speculating or relying on a theory that the court found insufficiently reliable even for trained experts. A verdict based on the second rationale would be directly contradictory to the uncontested evidence that the ballast temperature could not have exceeded 340 . Jury verdicts may not be based on speculation or inadmissible evidence or be contrary to uncontested admissible evidence. *See Franklin*, 141 F.2d at 570; *Kaiser*, 741 P.2d at 719. We therefore find that the district court did not err in granting MagneTek's motion for summary judgment.

#### Conclusion

Though the theory of long-term, low-temperature ignition of wood is an interesting one that eventually may be sufficiently tested and researched to serve as the basis for an expert opinion under Rule 702, the district court's careful analysis of the scientific literature presented in this case convinces us the court did not abuse its discretion in ruling that the foundation for pyrolysis has not yet reached that point. We also hold that the court did not err in granting summary judgment because without the pyrolysis theory, Truck could not produce evidence that would allow a rational trier of fact to find that the ballast could have become hot enough to start the fire at Sammy's Restaurant.

The judgment of the district court is therefore **AFFIRMED**.