

It's a long way down Fluke infrared thermometers help keep motorists safe on Pike's Peak Highway

Application Note

Field Applications Case Study



Tool: Fluke 62 Non-Contact Infrared Thermometer

Profile: Terry Barrett, Ranger Captain, Pikes Peak Toll Road

Tests conducted: Automotive brake temperature.

The view from the summit of 14,110-foot Pike's Peak is spectacular. Back in 1893, it inspired Katharine Lee Bates to write the song "America the Beautiful."

But for motorists who aren't prepared, the drive back down the mountain can be anything but beautiful. Pike's Peak is no place for bad drivers—or bad brakes.

Over 12.5 miles of slippery gravel the road descends 4,910 feet—nearly a mile—and rounds 156 curves, not one with a guardrail. Steep downslopes end in hairpin turns that demand skilled driving and test the performance of transmissions, suspensions and brakes.

The road is so challenging that since 1916 it's been home to the Pike's Peak Auto Hillclimb. Except for the Indy 500, it's America's oldest automobile race.

"There are a lot of people who don't understand about driving in the mountains," says Terry Barrett, ranger captain with 28 years experience on the Pikes Peak Toll Road. "So they don't gear down enough. If their brakes get too hot, they're going to lose them."

And then? "We have some real tight curves," says Barrett. "They go over the side because they can't make the curve."

To prevent such accidents, rangers on the Pike's Peak Highway give drivers a helping hand. In summer, five miles downhill from the summit, they stop each vehicle and check their brake temperature with a Fluke 62 Non-Contact Infrared Thermometer.

"We also use our senses," Barrett adds. "If you can see smoke rolling out, you know there's a problem."

For the past fifteen years, rangers have used Fluke-manufactured infrared thermometers for the brake checks. It's a big improvement over earlier years. When Barrett started in 1978, rangers checked for hot brakes with their bare hands.

"For years after I started here we tested with our hands," she says. "You talk about blisters! It was rather painful, but you eventually get a big thick callus." Non-contact testing with the Fluke 62 provides benefits the Pike's Peak rangers can really put their fingers on.

Each brake test takes just seconds, but it can be a life saver.

If a driver's brakes test hotter than 300 degrees, rangers advise them to pull over and wait for an hour while their brakes cool. They're also reminded of the mountain driving basics: gear down and let your engine and transmission slow the vehicle. If necessary, stop and cool off.

But some people don't get it. "There are some people who don't believe us," Barrett recalls. "We had a classic example. A ranger told this driver his brakes were too hot, and to

stop. The guy pulled over, then when he figured the ranger wasn't watching he backed out and took off. He ended up rolling his car a couple of hundred yards below."

Most drivers follow the rangers' advice, and that gives Barrett a real feeling of satisfaction. In the summer's heat, up to 500 vehicles a day climb Pike's Peak, and they all have to get back down. With help from the Pike's Peak rangers, they make that trip safely.

As Barrett sums it up, "I think we save quite a few people every year."

Brakes: How hot is too hot?

Automotive brakes function by using friction to convert a vehicle's kinetic energy into heat. That heat is stored in brake disks or drums, then radiated into the air or dissipated through air vents.

But if brakes are overworked, brake pad performance breaks down, causing brake fade. As the driver presses harder and harder on the pedal, he feels less and less response from the brakes. Eventually, the brakes fail altogether.

Worked hard enough, any brakes will fade. Race cars use oversize disks to absorb more heat and dissipate it faster, with race-specific linings capable of functioning at up to 2200 °F. Some even use 'carbon-carbon' brakes designed to perform at red-hot temperatures.

On the street, most of us get by with the brakes that come standard on our vehicles. Standard brake pads are a compromise, designed to deliver not just fade resistance, but long wear, squeal-free braking and economy too. They have to do it all.

In the mile-high climb to the top of Pike's Peak a vehicle accumulates



tremendous potential energy. Coming back down, the brakes and drive-line have to absorb that energy as the driver negotiates a series of steep downhill sections, separated by hairpin turns—with no guardrail. Proper use of lower gears and engine braking is essential to help the brakes of most vehicles survive the ordeal.

When Pike's Peak Toll Road rangers check for overheated brakes part way down the hill, they use a disk temperature 300 °F as a sign that the driver needs to pull over, cool it for a while, and change their technique for gearing down.

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