

**THE ADVANTAGES OF THE SMART-FLOW™ PRESSURE RELIEF VALVE**  
*The Intelligent Solution for Relieving Rail Tank-Car Pressure*

**Optimized Flow is the Difference**

Flow rate plays a key role in helping achieve the **right balance between minimizing the loss of product and tank car integrity**. The Smart-Flow PRV optimizes the flow rate to deliver superior performance and safety.

**Proof-Positive Performance**

To validate the Smart-Flow’s performance:

- Midland employed the AFFTAC model, worked closely with our tank car industry contacts and followed the latest simulation parameters
- Ran simulations using the pressure/flow parameters of the 10,730 SCFM Smart-Flow PRV and numerous alternatives
- The Smart-Flow PRV showed critical and specific performance advantages over the competition
- We focused our comparison on **two critical performance parameters**. The first was **time before tank failure**. The recently passed *Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains* regulation (HM-251) stipulates tank cars meet or exceed 100-minutes in a pool fire. For each valve, we compared how long the simulated tank car lasted before a failure or breach in the tank-car sidewall occurred.
- The second element was the **amount of lading at failure**. At the time of a simulated tank-car failure, the amount remaining in the tank is important. In simple terms, the more lading - the “fuel” to feed a high-energy event - the larger and more destructive the explosion.



**Smart-Flow**  
PRESSURE RELIEF VALVE

**Smart-Flow PRV Delivers Superior Results**

- **Increases Time before Failure** – More time for First Responders / Enhanced Evacuation time
- **Keeps Tank-Car Cooler** – Lowers risk of rupture
- **Lower Flow** – Minimizes the scale of potential fires and catastrophic events
- **Minimizes Product Loss** – Lower environmental impact and cleanup costs
- **Minimizes Remaining Lading** – Less “fuel” to burn, decreases source of thermal energy

Smart-Flow PRV vs. Competition			
Flow rate (SCFM) @ 75 PSIG	Comp PRV (1,800)	Smart-Flow (10,730)	Comp PRV (27,000)
Time before Tank Failure (minutes)	446	367	312
Lading Remaining	32%	<1%	<1%

**Did You Know ?**

At the 2-hour mark...The 27,000 SCFM relief valve would have discharged 2X the amount of crude oil, potentially fueling a larger event or spreading dangerous flames!

(Note pg. 2 data - Fraction Tank Filled vs. Time)

**Time to Tank Failure**



\*Smart-Flow provides the best combination of time before failure and percent of lading remaining.

# SMART-FLOW™ PRV ADVANTAGES

## AFFTAC Simulation Parameters

Temperature Protection	Shell Thickness	Jacket Thickness	Commodity	Rollover
Thermal Blanket	9/16"	1/8"	Bakken Crude	120°

## Performance Results – Smart-Flow PRV vs. Comp PRV

