

Bleeder/BF Subcategorization

Introduction

Pressure relief devices (PRDs) are safety devices included in the design of every blast furnace (BF) that provide a limited opening when needed to prevent both dangerous over pressurization of the BF top and the catastrophic failure of the pressurized BF itself, and to ensure that gas does not build up inside the vessel, which creates a risk of explosion. Unplanned openings of PRDs occur automatically to prevent significant safety risks to personnel and damage to the equipment, including severe damage to the BF top. Thus, PRDs are a necessary element of safe BF operation.

The pressure inside a BF is created by the insertion of hot air into the BF to aid iron oxide reduction and the withdrawal of process blast furnace gas (BFG) from the BF. The BFG gas is then used as a fuel in BF stoves. BF pressure is measured continuously, and the maximum allowed pressure is determined by the individual furnace design and structural limitations, which creates a unique pressure set point for each furnace to protect the furnace from catastrophic failure. Larger furnaces are more modern than smaller furnaces and are designed for higher top pressure operations. PRDs are installed to open if the pressure exceeds the design set point, releasing pressure for the safety of employees and the equipment.

Because of the necessity of PRDs and their effect on safety, Industry believes that EPA should not move forward with any limitation on the number of unplanned PRD openings. Setting such a limit can lead to unintended catastrophic consequences.

If the Agency does move forward then it should, at a minimum, establish subcategories based on furnace size. Larger blast furnaces are able to accommodate higher internal pressures before the need for an unplanned opening. Thus, EPA should not treat all blast furnaces alike and should create two separate subcategories of blast furnaces.

Subcategories: Large BFs and Small BFs

The data demonstrates that larger BFs have significantly fewer unplanned openings where "Large BF" is defined as a blast furnace with a working volume greater than 2,500 cubic meters (m³). With this definition, only four of the fourteen existing blast furnaces would be in the "Large BF" subcategory: Indiana Harbor No. 7, Gary No. 14, Burns Harbor C, and Burns Harbor D, while the remaining existing blast furnaces ("Small BFs") would be a separate subcategory. The above-defined Large BFs typically have very few unplanned openings each year due to design elements which allow higher operating pressure near the valve openings. For example, Gary No. 14 operates at a top pressure of approximately 22 pounds per square inch (psi) whereas the smaller blast furnaces at that facility operate with top pressures in the range of 5 to 10 psi.

Large BFs are designed to operate at high top pressure, and the top and gas cleaning systems are also designed to operate at high pressure. The PRDs are set at correspondingly higher

pressures. Operational problems like slips may still occur, but they rarely result in PRD openings because the system is designed to accommodate higher pressures.

The more numerous subcategory of Small BFs (a working volume less than 2,500 cubic meters (m³)) are typically designed to operate at lower top blast pressures and, likewise, the top and gas cleaning systems are not designed to withstand high pressures. Thus, the PRDs open with lower pressure setpoints to avoid safety incidents and catastrophic damage. This difference in pressure is not something that can be changed or modified in the existing BFs.

To increase operating pressure, the furnace shell, stove shells, dust catcher, primary washer, and gas mains must have the structural integrity to withstand the increased top pressure. Thus, it is not possible to achieve high top pressures in Small BFs that are not designed to withstand these operating conditions. As such, subcategories are warranted since this has a direct impact on the number of unplanned PRD openings.

Issues with Proposed Rule Language

EPA proposes that “Multiple openings and closings of a bleeder valve that occur within a 30-minute period **could** be considered a single bleeder valve opening.” In EPA’s April 3, 2023, UFIP Memorandum, EPA indicates that such events *shall* be considered a single opening. In the Industry’s experience, it would be more appropriate to treat even longer events as a single opening because it is highly unusual for independent events to cause multiple openings in such a short period of time. Instead, we believe that multiple PRD openings at the top of the BFs over 120 consecutive minutes (2 hours) should be considered a single opening or “event.” It is important that this point be included explicitly in regulatory text.

In addition, the proposal does not distinguish between types of pressure relief device openings except to distinguish between planned and unplanned openings. Pressure relief devices that are located after a dust catcher or a scrubber, referred to in the Industry as a semi-clean or clean gas bleeder valve, result in lower emissions and lower opacity. These openings were not the subject of the 2022 ICR data collection. Therefore, any limitation on the number of openings should only apply to PRD openings that are located before dust catchers or scrubbers, or on top of the blast furnaces, which were the subject of the ICR. EPA should make it clear in other provisions of the rule that there is no limitation on the number of openings of PRDs located after dust catchers or scrubbers. Industry therefore suggests the following text to make this clarification.

Planned pressure relief device opening means the opening of a blast furnace pressure relief safety gas bleeder valve, prior to a dust catcher or a scrubber (and if both are in place, it means the opening prior to both), that is initiated by an operator. These openings are located on furnace offtakes.

Unplanned pressure relief device opening means the opening of a blast furnace pressure relief safety gas bleeder valve, prior to a dust catcher or a scrubber (and if both are in place, it means the opening prior to both), that is not a planned pressure relief device opening.

Unplanned pressure relief device opening event means all unplanned pressure relief device openings on a single blast furnace, prior to the dust catcher or scrubber, that occur within 120 consecutive minutes regardless of location on the blast furnace.