Reverse Pulse Cleaning System – Product Data

What It Does

The reverse pulse cleaning system is the part of a ceramic filter (1) that is concerned with detaching the accumulated solids from the surface of the filter element (2) and inducing them to drop to the bottom of the hopper, from where they can be discharged. This operation of detaching the solids is accomplished by a pulse, or blast, of compressed air being applied to the ceramic filter element outlet. This reverses the normal flow, hence the equipment is called the reverse pulse cleaning system.

How It Works

Compressed air is stored in the **reverse pulse air reservoir**, typically at 4.5 bar. The reservoir is normally mounted on the side of the filter vessel. Above the reverse pulse reservoir are located a number of **pulse cleaning valves**, one for each row of ceramic filter elements. Each pulse cleaning valve connects to a **reverse pulse cleaning tube**, which distributes the cleaning pulse to the ceramic filter elements. The tubes are drilled with **7mm diameter holes**, one for each filter element in the row. The holes point directly down into the open end of the filter elements.

In normal operation the process gases pass through the filter medium at a superficial velocity of about 3 cm/s. This flow typically requires a pressure difference of up to 20 – 25 mbar between the dirty side and the clean side.

When the reverse pulse valve is opened, the reverse pulse tube becomes pressurised with air to a pressure of nearly 5 bar. The holes in the pulse tubes act as sonic chokes and the air is emitted through them as powerful jets pointed at the open ends of the filter elements. As the jet moves away from the tube and approaches the filter element it spreads out in area, losing speed, but entrains a substantial volume of process gas. At the open end of the filter the jet is typically travelling at 100 – 130 m/s and this velocity creates a pressure of, typically, 120 mbar inside the filter element.

This pressure inside the filter element is sufficient locally to overcome the opposing pressure of 20 – 25 mbar. In fact there is a substantial excess of pressure and this momentarily creates a reverse flow. This flow is typically several times the flow velocity in the forward direction, and it is sufficient to apply an outward force on the filter cake of accumulated solids that is on the outer face of the filter element. This cake has little strength in tension and flakes are soon fractured off and drop down away from the filter element into the collection hopper.

In the first 10 - 20 reverse pulse cleaning cycles only a proportion of the collected dust is removed by the cleaning action. The remainder forms a conditioning layer which increases the pressure drop across the filter. After these initial cycles equilibrium is reached and the pressure drop stabilises at a level that is mainly a function of the properties of the dust.

References

1. Caldo data sheet DS001 ‘Ceramic Filters – Product Data’
2. Caldo data sheet DS002 ‘Ceramic Filter Elements – Product Data’

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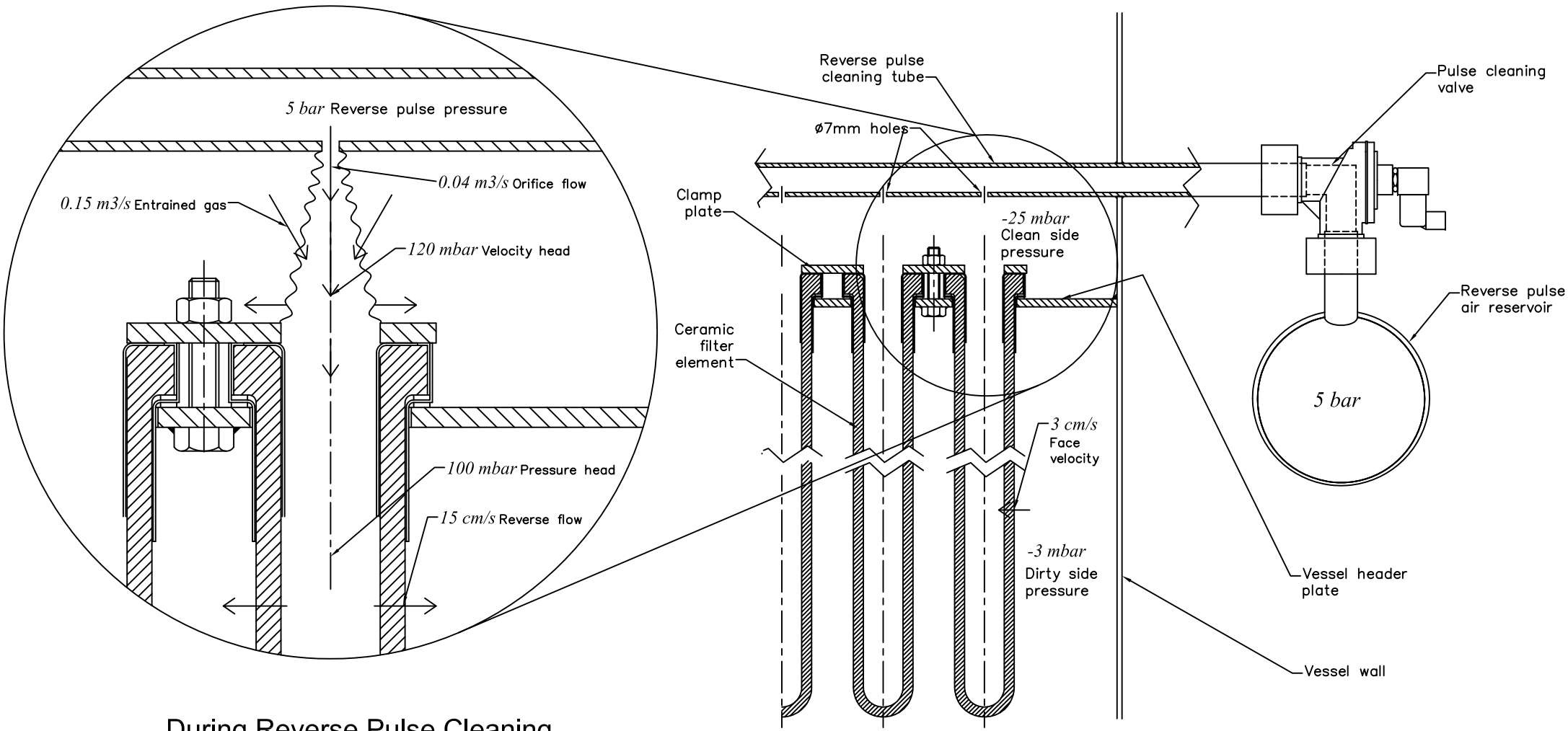

During Reverse Pulse Cleaning

Normal Operation

Issue	By	Date	Issue	By	Date

CALDO ENGINEERING LTD

Customer	Marketing	Title	On-line Reverse Pulse Cleaning – Schematic
Project	Data Sheets		
Drawn By	CJW	Date	21.06.12
Checked By		Scale	NTS
		Drawing No	DS004