

# Screw Pumps in the Bitumen Industry:

## Part(1) :Viscosity Range Considerations

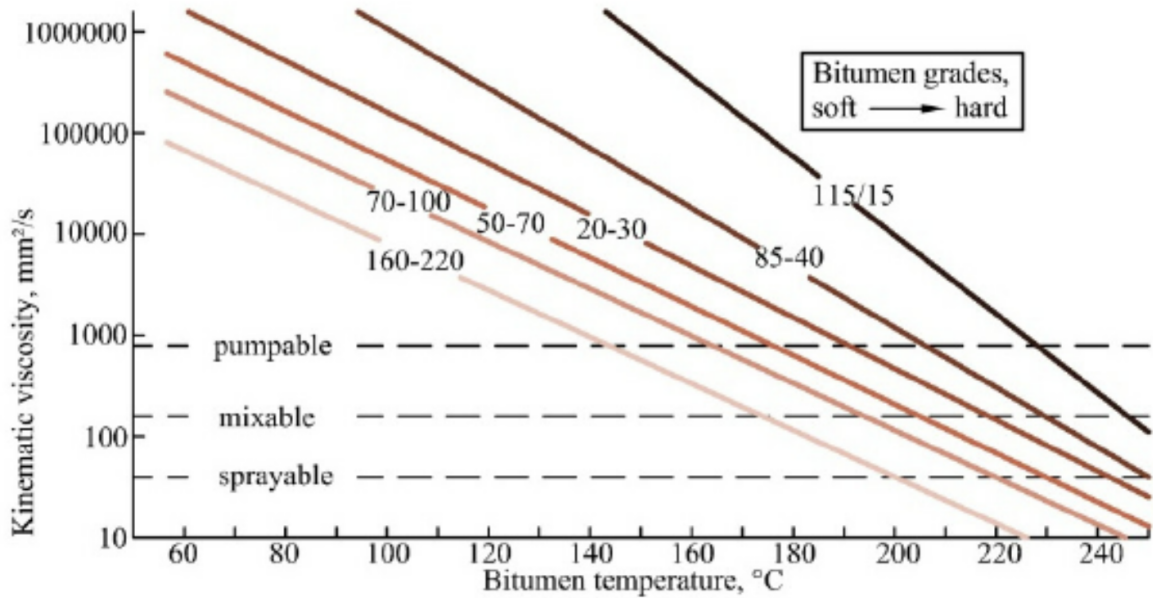
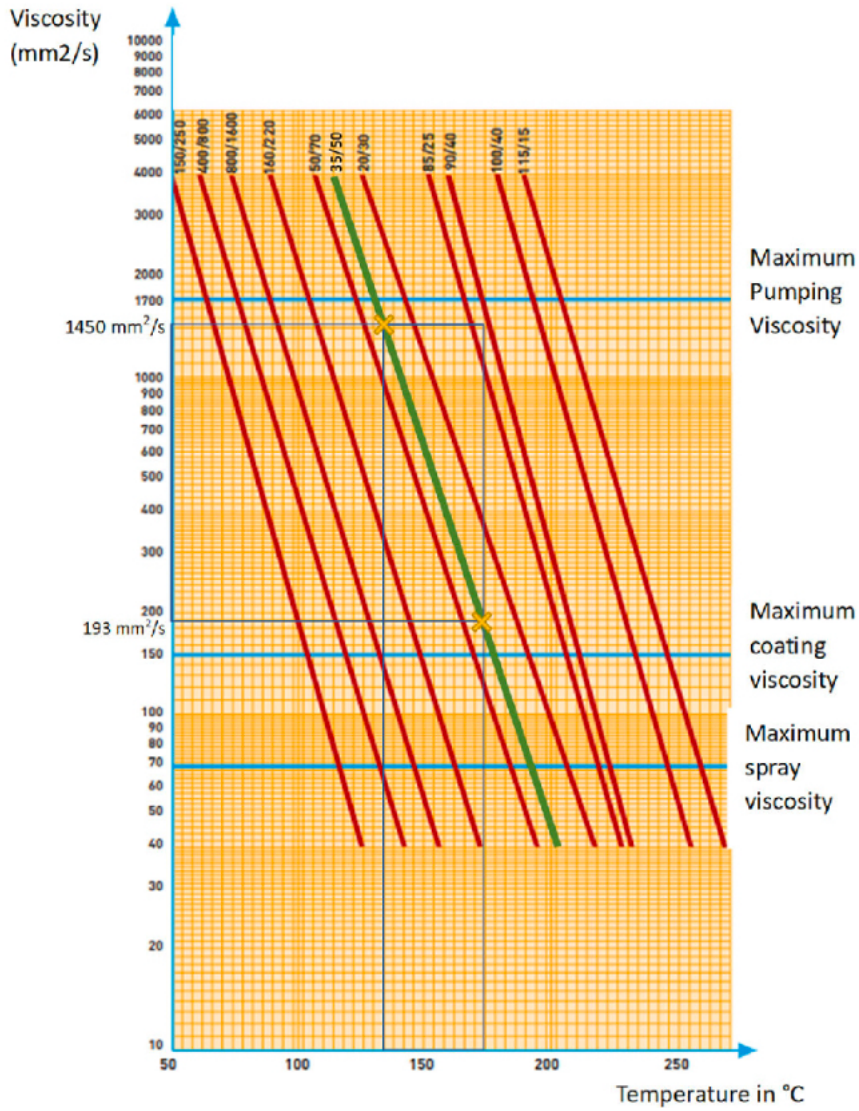
Screw pumps are extensively used in the bitumen industry, particularly in large-scale production, playing a crucial role in both the production process and the storage and loading operations.



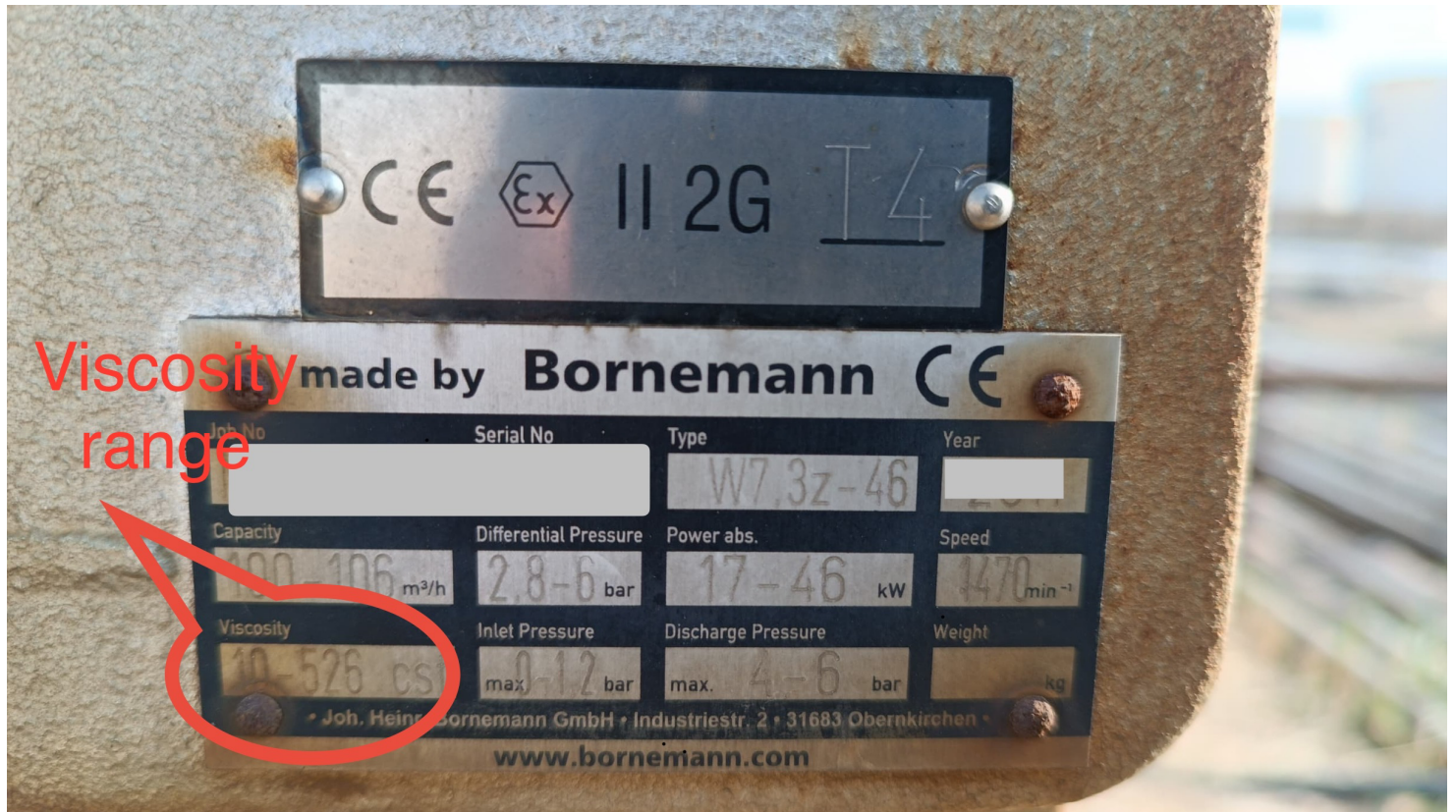


When handling a viscous fluid like bitumen (which viscosity varies depending on the fluid temperature), it is essential to integrate positive displacement pump technology with thermodynamic principles to enable effective pumping.

As shown in the diagram below, the viscosity of different grades of bitumen fluctuates significantly at different temperatures.



To ensure proper pump operation, you must refer to the pump's nameplate (as seen in the image below), which specifies the viscosity range within which the pump can operate.



This range determines the temperature limits of the fluid (in this case, bitumen) that the pump can handle effectively. It is critical to maintain the fluid temperature within the specified viscosity range to avoid operational issues, as outlined in the table above.

Additionally, always consider the pump's working temperature to ensure optimal performance.

## Consequences of Operating Positive Displacement Pumps Outside the Recommended Viscosity Range:

### 1. Increased Wear and Tear:

High-viscosity fluids can place excessive stress on pump components, accelerating wear and tear,







while low-viscosity fluids may fail to provide sufficient lubrication, causing friction and damage.



## 2. Reduced Efficiency:

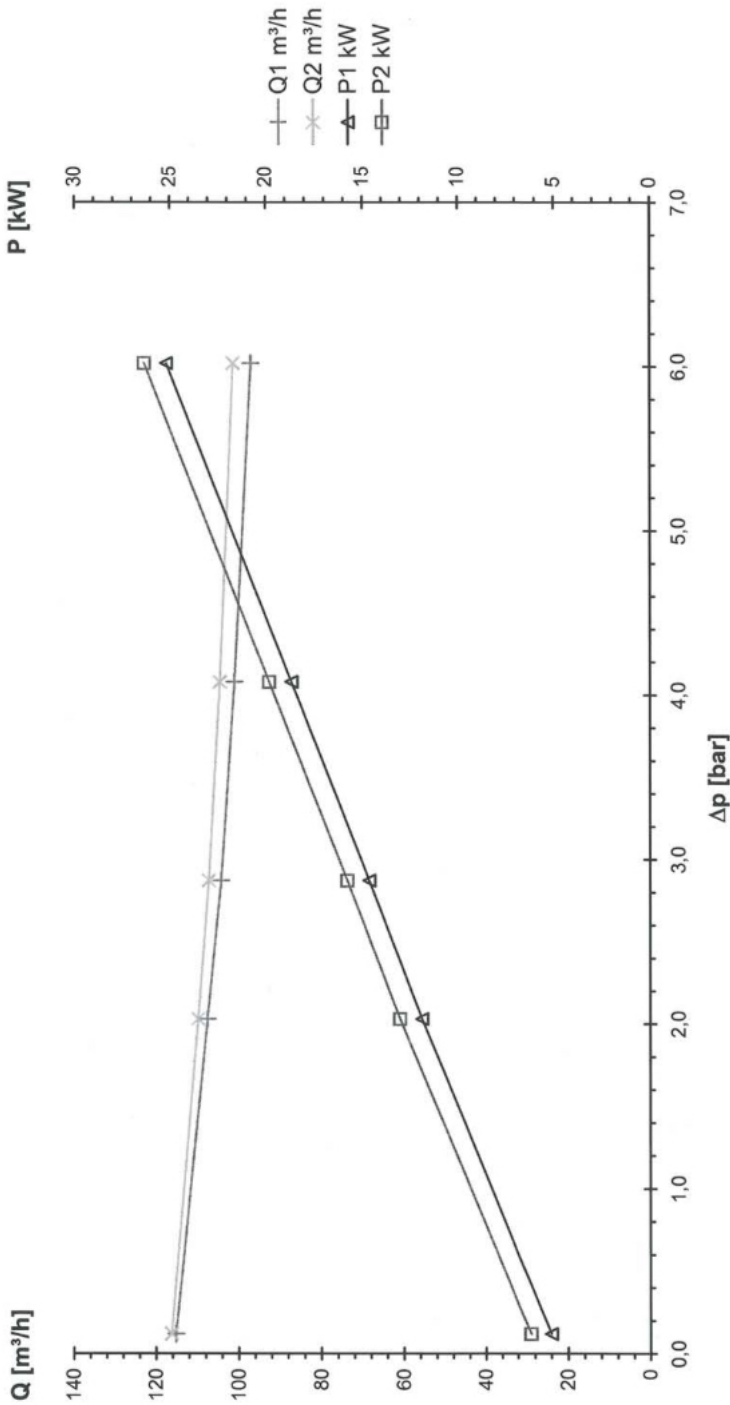
If the fluid is overly viscous, the pump may struggle to move it, consuming excessive energy and reducing efficiency. Conversely, low-viscosity fluids can lead to internal leakage, decreasing volumetric efficiency.



Serial No. : 109142  
 Comm.- No. : ND 81100361  
 Customer : Pasargad Oil Company  
 Type : W7.3z-46/2  
 n1 : 1469  
 n2 : 1470  
 V1 : 1  
 V2 : 10-526  
 Measuring date : 04.11.2011

1/min  
 1/min  
 mm<sup>2</sup>/s  
 mm<sup>2</sup>/s

**Pump - Test stand  
Bornemann**

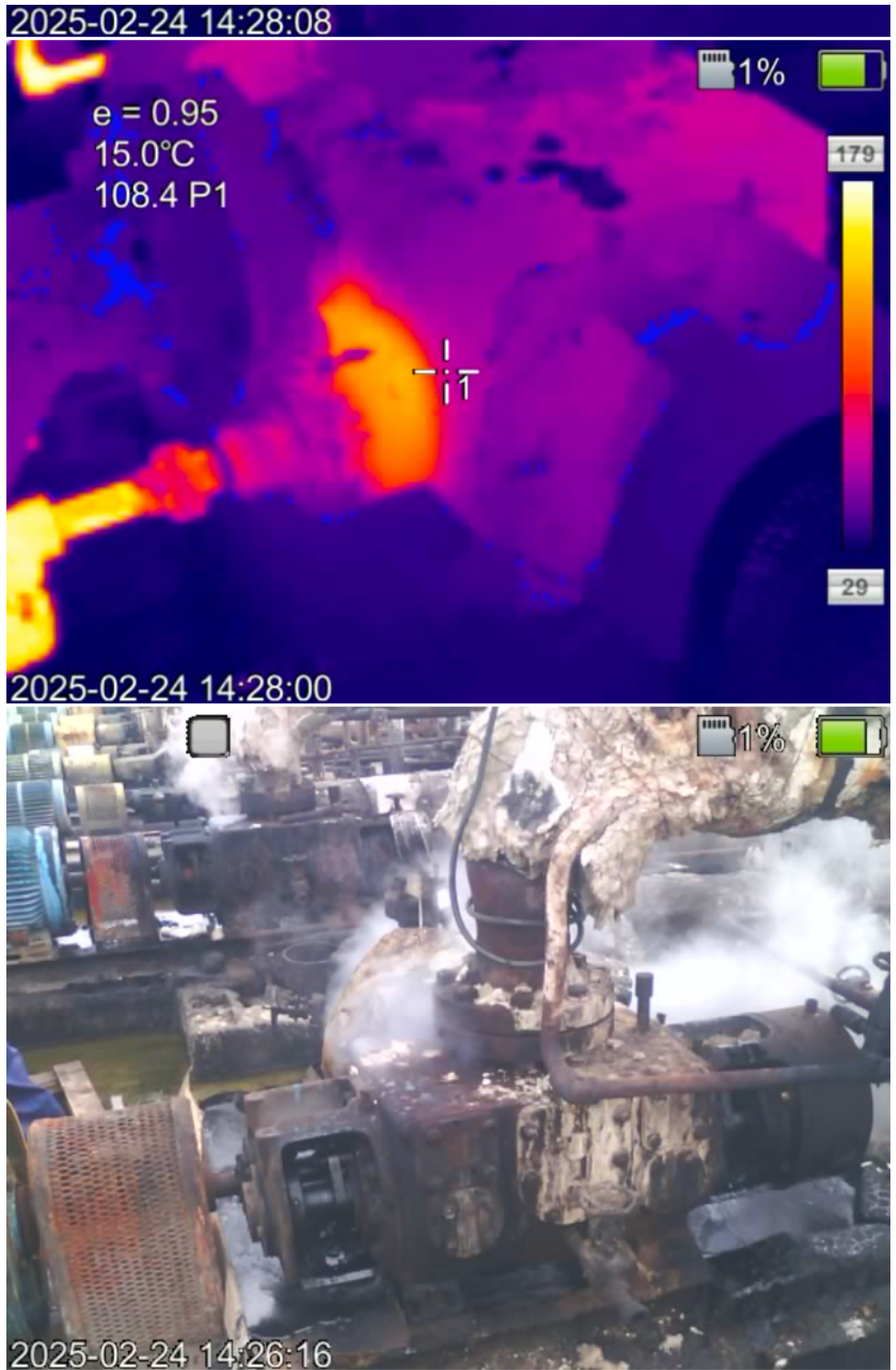


**3. Cavitation and loose suction Risks:**

High-viscosity fluids require greater suction head. If the pump cannot provide it, cavitation and loose suction may occur, leading to vapor bubble formation and collapse and less than minimum flow or even no flow, which can damage the pump.

**4. Overheating:**

Pumping fluids outside the recommended viscosity range can generate excessive heat due to friction or inefficiencies, potentially leading to overheating and pump failure.



### 5. Seal and Bearing Damage:

Incorrect viscosity can compromise seals and bearings, resulting in leaks and mechanical failures.



## **6. Inaccurate Flow Rates:**

Positive displacement pumps depend on precise fluid movement. Variations in viscosity can result in inconsistent or inaccurate flow rates, disrupting the process.

To prevent these issues, it is essential to select a pump suited for the specific viscosity range of the fluid and closely monitor operating conditions.

In the next posting article , I will discuss strategies to mitigate the risks of operating positive displacement pumps outside their recommended viscosity range.