

Manufacturing of Zone Valve Bodies

Zone valves are used in heating, ventilation, and air conditioning (HVAC) systems to control the water or steam flow to different building areas, allowing for independent temperature control and energy efficiency. By dividing a building into separate zones, each with its zone valve, occupants can independently control the heating or cooling in different rooms or areas, optimizing comfort and reducing energy waste.

They are typically made of brass or stainless steel through closed-die cold forging. This article explores the principles of die forging, providing a good understanding of how HVAC zone valve bodies, excluding the trims and seats, are made.

Die Forging:

- **Forged Metal:** Shaped by plastic deformation using compressive load within dies.
- **Die Forging:** Metal blank is deformed in a die to achieve desired dimensions and properties.
- **Metal Forging Process:** Shaping metal by plastic deformation with compressive load, classified into open-die and closed-die forging.
- **Open-Die Forging:** Simple shapes formed by compressive load, allowing material to flow freely.
- **Closed-Die Forging:** Workpiece is placed between custom-shaped dies, compressed to fill the die cavity, forming the desired shape. Excess material (flash) is trimmed off.
- **Cold Forging:** Deforms raw material at room temperature, achieving high-speed production with minimal waste and strong end products.

Closed-Die Forging Process:

- Metal is placed in a die mold and hammered to fill the die cavities.
- Flash is formed and trimmed off after forging.
- Common materials include steel (alloy, carbon, stainless) and brass.

Manufacturing Process of Forged HVAC Zone Valve Bodies:

1. **Material Selection and Inspection:** Choose appropriate metal (stainless steel or brass) based on application needs. Inspect for quality to prevent defects.
2. **Removing Excess Material:** Flash is removed through machining or manual finishing to ensure correct shape and dimensions.

Conclusion: The manufacturing process of forged zone valve bodies is detailed and ensures high performance and reliability under harsh conditions. Forging technology continues to evolve, supporting various manufacturing needs and contributing to industry sustainability.