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Black Liquor Service

The Kraft Process (Pulp and Paper)

Tree logs are pulped by using "white liquor" (consisting primarily of sodium hydroxide and sodium sulfide), process water, heat, and pressure to separate wood chips into lignin and cellulose fibers. Wood chips contain approximately 50% water and 50% wood by weight. Process water and white liquor are necessary to create "black liquor". Black liquor is created when the process water is drained off and recycled, leaving lignin, other organic chemicals, and inorganic chemicals behind. Water is removed until the black liquor has a viscosity similar to molasses, and has a composition of 60 percent solids by volume. At this stage, a small amount of diesel fuel is added to the black liquor to produce a low cost fuel mixture to burn in plant boilers. This helps the process become more energy efficient. The black liquor burn is not 100% efficient, and a residue called "green liquor" remains. Green liquor is further chemically treated, and recycled to the start of the process to become white liquor.

Black Liquor Assembly Characteristics

Handling these process chemicals and byproducts are difficult in piping and ball valves. Pipe diameters vary between 2"-10", but the most common sizes are 4", 6", and 8". These processes are typically ANSI/ASME Class 150 and ANSI/ASME Class 300, with 150# and 300# flanges being the most common end connection. Process temperatures are normally hot, and are between 250°F and 350°F. Valve body and end connection materials of construction are typically 316 stainless steel, but carbon steel is also requested. Applications can require manual lever, gear operated, pneumatic actuators (spring return fail close), and electric actuators in valve assemblies.

Ball Valve seat designs need to be altered to handle the viscous, sticky molasses-like liquor that builds up on the ball valve face, and contaminates the back seat areas. This creates large internal clearance forces, resulting in valve lock-up over long static periods of time. A-T Controls has designed a solution for this severe pulp and paper service and black liquor service with special modifications to our FMS series. This valve incorporates a "scraper seat" design that removes the baked on molasses-like residue that resides on the face of the ball. This eliminates valve lock-up. Aflas® o-rings are added to seal the seat cavity from media build-up, and a venturi hole in the ball is added.

Please consult A-T Controls for material selection for your black liquor application. These parameters are guidelines, and customers are responsible for materials of construction, preparation of the valves for service, and lubricants being compatible with their black liquor application.

Valve Packages (*Others Available*)

Series FMS- Sizes ½"-8", ANSI/ASME Class 150/Class 300 with 150# and 300# flanges, API 607 4th Edition, Tungsten Carbide coated metal scraper seats (Aflas® o-rings and Venturi Ball are recommended for black liquor service; specify B in option 6 in Part Number Matrix for black liquor service when ordering)

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