Innovative Unheading and Isolation Valves for Coker Unit Application

Latest Unheading Technology

Coking.com Safety Seminar

ZIMMERMANN & JANSEN

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Leader in Valve Technology
for Chemical / Petrochemical, Glass and Steel Industries
- speciality engineering and manufacturing
- critical/severe service conditions
- large diameter designs
- high temperature service conditions

Company Profile
- 125 years of experience in specific valve applications
- in house design & engineering facilities
- fully integrated and certified fabrication facilities
- certified quality management system
- extensive testing facilities
- field and shop service capabilities
Z&J Double Disc
Automatic Bottom
Unheading Valve
System

Design Philosophy
Z&J utilizes the latest and most advanced design and engineering methods available on the market today.

- FEA / FEM
  - stress
  - deflection
  - temperature
- flow analysis
- fatigue analysis
- various types of conventional calculations
Bottom Unheading Valve Installation

- removable upper body seat arrangement
- body purge connection
- body inspection cover
- wedge ball arrangement
- two independent discs
- hardfaced seats (body and discs)
- guide plates
- body drain connection
- throughput
- DETAIL A
Removable Upper Body Seat Arrangement

DETAIL A

- removable upper seat assembly
- surface overlaid
- scraper edge
- upper body stub
- upper guide plate
- disc cage
- upper body seat
- upper disc

Typical Site Installation

"IN LINE" Actuator System
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Typical Site Installation

"TOP & BOTTOM" Actuator System
"SIDE by SIDE" Actuator System

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Z&J Double Disc Bottom Unheading Valve

- Valve capable for modulating service.
- Real double block and purge performance within one valve body due to two independent discs.
- Independent valve discs for top and bottom sealing (double disc design).
- Active mechanical seating force due to central wedge-ball arrangement.
- Elimination of thermal warping due to circular shaped discs.
- Fixed and rigid scraper with additional spring loaded seat arrangement.
- Corrosion and wear resistant hardfacing overlay on the seat; No adjustment and replacement required.
- No deposits of solid particles in valve body due to valve gate carrier guided between guide plates.
- The sealing surfaces are completely covered in each gate end position. Depositing within the valve and on the seats is avoided.
- Easy maintenance accessibility of top seat arrangement and top disc.
- Permanently attached emergency actuator device.
- Availability of dual cylinder assembly to shorten overall length.
- No cooling box required for stem cooling.
- Gaskets and stuffing box packing fulfilling all low emission specifications.
- Extremely low steam consumption with no steam escaping to the atmosphere during coke drum filling.
60" Z&J Coker Bottom Valve Operational Summary

- Service in Torrance refinery: Jan. 27, 2006 to the present
- Completed > 130 complete coking cycles as of Nov. 1, 2006 (full pressurization; temperature; coking; decoking)
  - Coker operation intermittent due to other refinery process unit outages not related to coker or Z&J valve
  - Many additional valve openings & closings resulting from coke throttling, operator training, and valve testing
- Valve is process fluid/resid-leak free; relatively high pressure operation—65 psig at oil in; ~100 psig at coke drum bottom by end of cycle
- Smooth opening/closing/throttling and reversing action (conservative design)
  - Full speed open time ~120 seconds
- Successfully throttles coke + water mixtures (key design criterion)
- Does not utilize steam in valve body during valve opening
  - No problem with excessive fines build-up in valve body

60" Z&J Coker Bottom Valve Operational Summary, cont’d

- No indication of valve degradation
  - E.g., no trend in rising actuator force, steam consumption, etc.
- No problems when valve body was inadvertently/erroneously not steam-pressurized on two occasions
  - No external resid leakage
  - Small amount of resid inside valve was easily removed through the condensate drain
- Back-up actuator (air motor) acceptable
- Operators like valve
- To date, valve meets specified design criteria
- Additional coker bottom valves will be worked through capital project system
Coke Drum Valves for Top Unheading,
Inlet Isolation, Overhead, and Blowdown

Expansion Bellows

- Inner Sleeve Pipe
  - guiding
  - bellow protection

- Expansion Bellow
  - single wave
  - stainless steel

- Seal Rings
  - floating
  - overlay - hardfacing

- Seal Weld
  - located on one side only
  - valve is unidirectional flow

- Bellow Void Area
  - packed w/Kaowool blanket
Expansion Bellows

Top Unheading Valve Installation
With RuhRPumpen Cutting Tool
Top Unheading Valve Installation