Fisher® Water Flood Solutions

FISHER®
Severe Service

EMERSON™
Process Management

Application Discussion

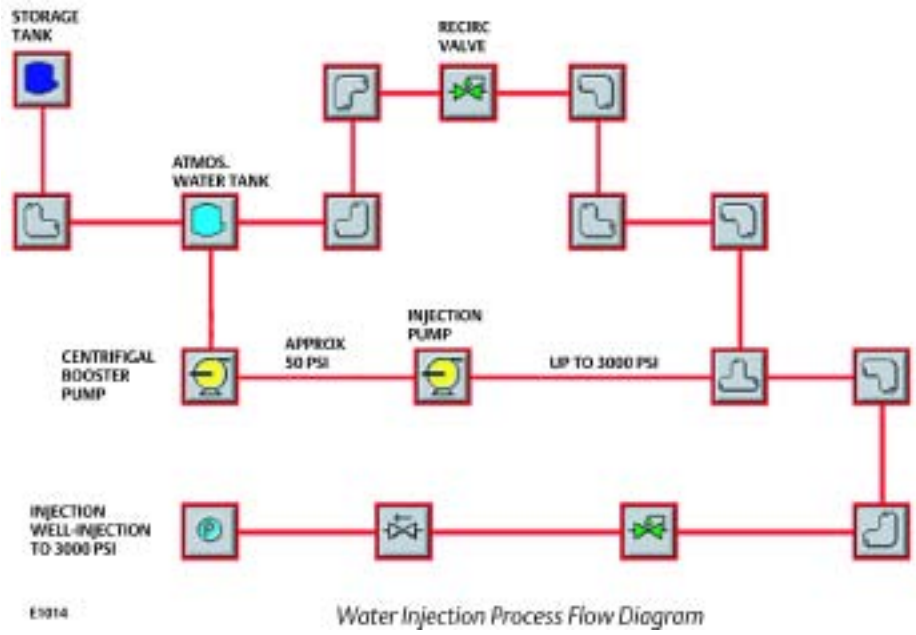
Practically all crude oil streams have some gas and water content that must be removed as the oil moves toward further processing. As oil wells mature, the ratio of water to oil increases, and produced water becomes a significant byproduct of oil and gas production.

Subsurface injection is the primary method for disposal of produced water at land-based oil and gas operations. Produced water may be injected for disposal to shallower saltwater formations, or it may be injected into older, depleted producing formations. By injecting the water into the producing formation, called Water Flood, well pressure and crude oil flow are maintained by replacing the produced oil.

There are two valves in the water injection process that have special requirements. The first is the injection valve at the wellhead, and the second is the minimum-flow bypass for the injection pump. These valves will be exposed to these challenges:

- Cavitation caused by large pressure drops
- Erosion damage caused by sand and other particulate

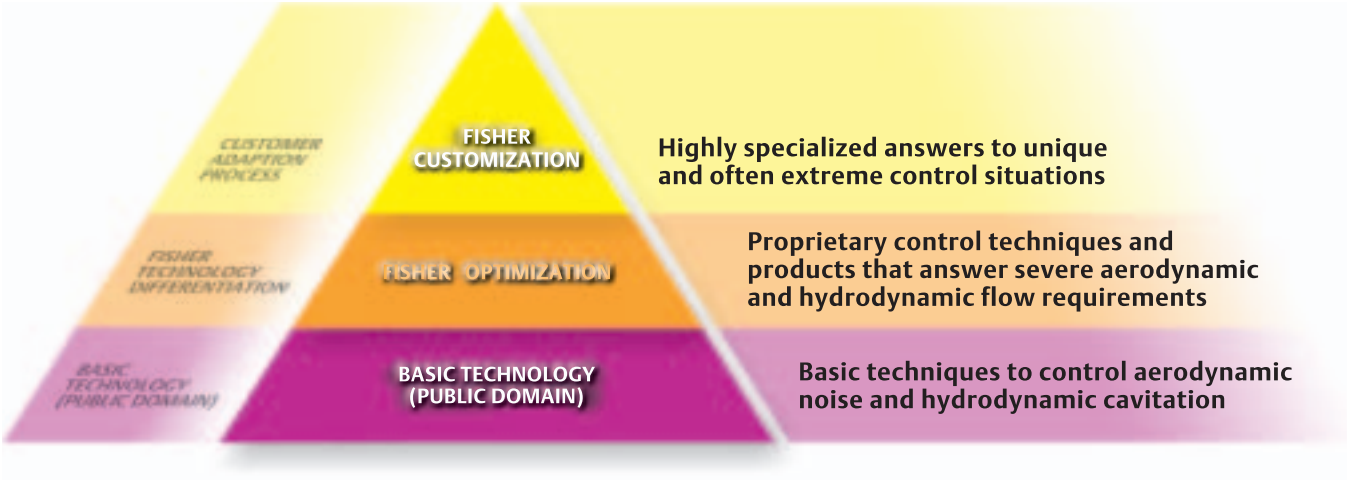
Emerson offers specific Fisher-engineered solutions for various water injection that offer protection against cavitation, erosion, plugging and leakage. The valves reduce high pressures while preventing the formation of cavitation by unique pressure control of flow through the valve. Both valves are exposed to high pressure when closed, and since leakage can cause extensive damage to the valve, tight shutoff (ANSI Class V or greater) is critical.



Water Injection Process Flow Diagram

To ensure proper operation after installation, a Fisher FIELDVUE® Digital Valve Controller can be used to monitor valve performance. The FIELDVUE DVC can provide diagnostic reviews without interrupting the process in order to identify potential performance issues. This helps to ensure proper operation and tight shutoff over the service life of the valve.

Severe Service Control Hierarchy



Water Flood — Control Valve Solutions

FISHER CUSTOMIZATION

Water injection valves on two offshore platforms near Thailand repeatedly failed due to erosion. The answer was to utilize characterized, Dirty Service Trim (DST) with its ability to pass entrained particulate while eliminating the potential for cavitation damage. See D351094X012 at www.Fishersevereservice.com for additional details.

FISHER OPTIMIZATION

DST Trim

- Patented, multi-stage, anti-cavitation control trim
- Combines axial and radial flow patterns that can pass particulate without plugging
- Features protected seat design that helps avoid clearance flow erosion for long-term shutoff integrity

NotchFlo® Trim

- Utilizes multi-stage, axial flow process to control pressure drop, prevent cavitation and pass entrained particles
- Features protected seat design that helps avoid clearance flow erosion for long-term shutoff integrity

Cavitrol® Trim

- Employs special-shaped orifices and drilled-hole technology in keeping the flowing media above its vapor pressure
- Used in combination with Fisher high-pressure and high-capacity valve bodies to prevent cavitation, achieve tight shutoff and reduce vibration levels

BASIC TECHNOLOGY

- On-off, automated choke valve or standard trim control valve with restriction orifice
- Single or multiple restriction orifices downstream to split the total pressure drop; optimum operation is restricted to one service condition
- Hardened or special trim materials to extend service life
- Angle pattern, flow down to minimize erosion on valve body
- Hub-style line connections to facilitate frequent replacement

Emerson. Your partner in instrument and valve reliability.
The way you manage your key production assets directly affects your plant's performance and profitability. Emerson's Asset Optimization capabilities deliver world-class services and innovative technologies to increase the availability and performance of mechanical equipment, electrical systems, process equipment, instruments and valves for improved bottom-line results. Asset Optimization helps you improve process availability and attain peak performance, which means wherever you are in your plant's life cycle—startup, maximizing operations or life extension—by relying on Emerson's Asset Optimization capabilities, you'll be on the path to realizing the true potential of your plant's instruments and valves.

The Next Step
Contact your local Emerson Process Management sales office or sales representative location for more information or to make a purchase.

For severe service solutions, see us at www.FisherSevereService.com

NORTH AMERICA
Emerson Process Management
Marshalltown, Iowa 50158 USA
T 1 (641) 754-3011
F 1 (641) 754-2830
www.EmersonProcess.com/Fisher

LATIN AMERICA
Emerson Process Management
Sorocaba, Sao Paulo 18087 Brazil
T +(55)(15)238-3788
F +(55)(15)228-3300
www.EmersonProcess.com/Fisher

EUROPE
Emerson Process Management
Cernay 68700 France
T +(33) (0)3 89 37 64 00
F +(33) (0)3 89 37 65 18
www.EmersonProcess.com/Fisher

MIDDLE EAST & AFRICA
Emerson FZE
Dubai, United Arab Emirates
T +971 4 883 5235
F +971 4 883 5312
www.EmersonProcess.com/Fisher

ASIA PACIFIC
Emerson Process Management
Singapore 128461 Singapore
T +(65) 6777 8211
F +(65) 6777 0947
www.EmersonProcess.com/Fisher

FISHER®
Severe Service

EMERSON™
Process Management

D351232X012 CD140 Printed in U.S.A. / April 2006