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# Fluid facts

Only EFI

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Engineered Fluid, Inc.

## EFI Raises The Bar In Control Valve Stations

Warren, Michigan's water is supplied by Detroit DWS. Improvements to the existing 42" transmission main resulted in higher pressures for Warren. Line pressure is expected to vary from 50 to 100 psig. To reduce the high pressure, Warren is installing four new factory-built, pressure reducing stations. One of these connections, Groesbeck Highway, is a 36" connection using a true 36" diaphragm control valve as shown. This station is the largest factory-built control valve station ever manufactured using a single control valve.

The EFI Rep for this project is Kerr Pump & Supply, Oak Park MI. The project Consulting Engineer is Anderson, Eckstein, and Westrick, Inc., Shelby MI. The Project Engineer is Lyle E. Winn, P.E. (lwinn@aewinc.com). With the decision to use factory-built pressure reducing stations, the Engineer and the City solicited design proposals and interviewed station and control valve manufacturers. Engineered Fluid, Inc. (EFI), Centralia IL was chosen as the designer, controls integrator and manufacturer of the pressure reducing stations. Cla-Val of Huntington Beach, CA was selected as the control valve manufacturer. Installation of the stations was competitively bid.

EFI is responsible for fully integrating the mechanical aspects of the pressure reducing stations with the control requirements for single system responsibility.

The project design requirement is to maintain discharge pressure within +/- 1 PSIG of the outlet pressure set point. EFI accomplished this level of control with a dual solenoid, electrically operated pilot system. Outlet pressure and inlet back pressure sustaining control is provided. Setpoint control is accomplished through use of a Programmable Logic Controller (PLC) based control and telemetry system, designed and manufactured by EFI.

The PLC receives analog signals from inlet and outlet pressure transducers, and a valve position indicator. The analog signals are processed by the PLC algorithms and compared to the setpoints and control valve position. Based on the deviation of actual pressures from the set-points, the PLC sends signals to the respective solenoid points. The solenoid valve let water into the cover chamber for closing action or let water off the cover chamber to open the valve. The solenoid valve actions maintain the inlet back pressure sustaining and outlet pressure setpoints.

The inlet back pressure sustaining and outlet pressure set

points are changed locally at the stations or remotely by telemetry link to the Warren DPW for varying system requirements. Warren can override the automatic controls to manually open or close the valves locally or remotely. Station status, inlet and outlet pressure, valve position, and alarms are transmitted by the telemetry control system to the Warren DPW offices.

At times, the pressure differential available to power the control valve is insufficient to operate the valve. To ensure sufficient hydraulic pressure to control the 36" valve, a pilot controlled water system was designed into the station. This control water system includes a pump, bladder tank, and controls for pump start/stop based upon pressure.

The control and isolation valves and the valve control system are constructed into a water-tight steel capsule. The construction of the steel capsule is designed to resist corrosion and provide a long service life. All manufacturing steps are performed under a Total Quality Management program.

Particular attention for the capsule construction is given to material selections, surface preparation, welding, and coatings for long term corrosion resistance. The transmission piping is 3/8" wall steel pipe.

Metal Inert Gas (MIG) is utilized and combined with automatic equipment for precise weld heat settings, weld wire feed rates, and weld lay down rates.

**LEADERSHIP** in Factory-Built Water Distribution Equipment...

is a **BIG** thing

Only EFI

Warren, MI - Groesbeck Hwy  
36" Pressure Reducing Station

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Prior to and after welding all inside and outside pipe surfaces, they are blasted to near white (SSPC-10). Following welding of the pipe sections, all the piping is internally coated with fusion bonded epoxy performed according to AWWA-C-213. The exterior pipe surfaces and the capsule shell surfaces, inside and outside, are coated with two coats of a two-part epoxy coating followed by Holiday testing.

The control valve by Cla-Val has an international flavor; it was cast in Bosnia, machined and fitted in Switzerland and shipped to the U.S. through Canada. The shipping weight of the valve was 19,000 pounds. The valve has stainless steel internal parts, a cast iron body and is fusion bonded epoxy coated. EFI manufactured the valve pilot control system at Centralia, IL.



This picture shows the 36" pressure reducing valve as delivered to EFI.

This picture shows the 36" valve assembled into the transmission piping with the inlet-side isolation, wafer butterfly valve.



This picture shows the piping coming through the capsule sidewall and tack welded into place prior to the inside and outside seal welding operation. The transmission pipe at the capsule shell weld joint has a 2" thick steel sleeve welded over it where it passes through the capsule wall; this sleeve pipe lining is attached prior to fusion bonding the pipe serves as a heat sink to keep the capsule seal weld heat from burning the fusion-bonded epoxy.

This picture shows the pilot piping and valving including the pilot control water supply line from the pressure tank.



This picture shows the cover chamber and the tank wall welding along with the ladder to the manway hatch, the heater and the cathodic protection system, anode test station.



This picture shows the pilot water system tank, pump and piping. Behind the 36" control valve is shown the breakaway coupling included to facilitate valve withdrawal if ever required.



This picture shows the tank top sheet with a steel, reinforced 7' x 7', equipment hatch above the valve for valve withdrawal and for lifting the dome off the valve for servicing the internal parts when required.



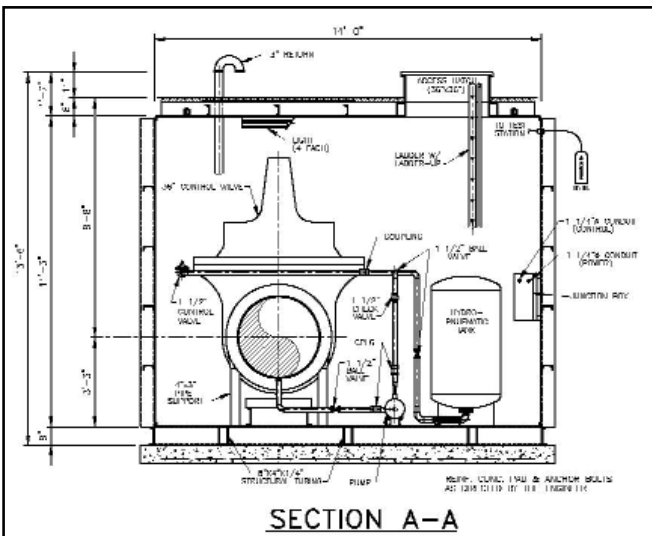
This picture shows the AWWA-M-11 restraints system built onto the transmission piping.



This picture shows Mike Johnson, one of EFI's Control System Designers/Programmers exercising the control system and the valve solenoids as part of the final QA checkout.



This picture shows the exterior of the finished 36" pressure reducing valve station ready for shipping.



## Drawing sections from EFI 36" pressure reducing valve station

