

## Well Control Valves

Our kelly, safety, and top drive valves have been the choice of well drilling and workover companies for more than 30 years. In 2013, M&M Oil Tools introduced the EZ-FIT CARTRIDGE™ — for faster, easier and more reliable field service while eliminating the need for special tools.

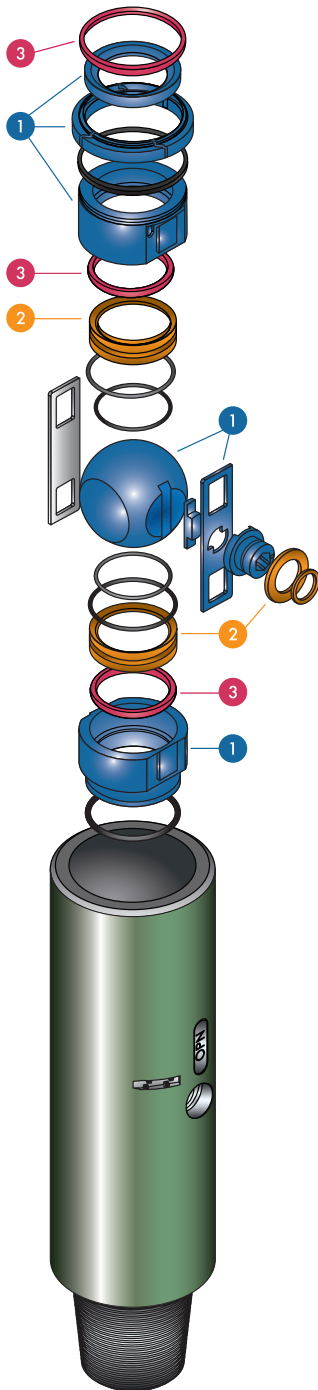
Our commitment to innovation continues today, taking the EZ-FIT design to a superior level of quality with the new EZ-FLOW CARTRIDGE™. Reengineered with upgraded materials, these valves are available in standard service and H2S trim configurations using corrosion-resistant stainless steel alloys conforming to NACE MR0175/ISO15156; offered with working pressures of 10,000 psi, 15,000 psi and 25,000 psi.

The EZ-FLOW CARTRIDGE valve's unique floating ball and spring loaded seat design forces pressure and flow through the seat, not around its exterior. This eliminates unreliable single direction seat seals, erosion and fouling/binding frequently seen in competitive designs. Our floating vented ball and double floating seats guarantee differential pressure by acting only across the downstream side of the ball and seat to minimize the load, prevent distortion of the ball and protect seat support arms. These features, combined with a proprietary stem bearing, reduce the torque required to operate the valve by 50% compared to other designs.

- Safety valves are designed to quickly stab into drillpipe, tubing or casing if a kick is encountered.
- Installed at each end of the kelly, or below the top drive, the valves control flow from the wellbore and protect surface equipment from high pressure kicks. The upper well control valve can also function as a mud saver valve by preventing mud loss and hazardous rig floor conditions when tripping pipe.
- Available in one- or two-piece design. A compact one-piece design is ideally suited where space is at a premium or where handling weight is critical. Its smooth OD allows this valve to be run anywhere in the drill string. The two-piece design is available when larger internal diameters are desired.
- Offered with a variety of threads including left-hand connections for upper well control applications that are matched to maintain drill string tensile strength capacity.

M&M's API Q-1 Quality Management System provides full traceability.

Drillpipe threads conform to API 7-1. Each valve is provided with material certificates, test reports and Certificate of Conformance.



## Well Control Valves What's in your H<sub>2</sub>S Trim Valves?

According to API Specification 7-1, paragraph 5.7.4, supplemental requirements for H<sub>2</sub>S trim: any valve internals exposed to the service environment must be in compliance with NACE MR0175/ISO 15156 Standard Materials Recommendations - Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments.

17-4PH (UNSS17400): precipitation-hardening stainless steel steel in HH 1150 condition has been successfully used for mildly sour environments. According to NACE MR0175, 17-4PH is acceptable for valve components other than the body and bonnet, provided that the partial pressure of H<sub>2</sub>S does not exceed 0.5 psi.

1. Given that the valves are only "H<sub>2</sub>S trim," they should not be used in severely sour conditions and that restriction is immaterial in the HH1150 condition.
2. Tough Met AT110 (UNS C72900): a copper-nickel-tin alloy designed for use in applications demanding wear resistance, high-bearing performance, and resistance to saltwater corrosion. NACE MR0175 indicates that copper alloys may be used without restriction in sour service conditions.
3. Alloy X-750: a precipitation-hardened, nickel-chromium alloy specifically approved for springs by NACE MR0175 at hardness values up to 50HRC. It is a good alternative to 17-7H for retaining rings.

The EZ-FLOW CARTRIDGE™ has patent protected technology.