Material Specifications for Cartridge Valves and Manifolds

In order to provide its customers with the highest quality hydraulic cartridge valves and manifolds, HydraForce follows a strict incoming inspection process on all parts and materials. All finished cartridge valves and manifolds are 100% tested and carry a five-year warranty against defects in material and workmanship. Here is a summary of HydraForce material specifications.

Standard Cartridge Valves

**Cartridge Valve:** Steel with hardened work surfaces to prevent scratching and wear; zinc-plated exposed surfaces. Freemachining, low carbon steel, such as 12L14 is typically used. Where needed, higher grade, heat-treatable steel, such as 86L20, or higher strength UNS 1144, is used.

**Internal Cartridge Components:** Hardened precision poppets, seats, spools and cages for long life and low leakage. Freemachining, low carbon steel, such as 12L14 is typically used.

**External Cartridge Components:** Adjustment screws are constructed of a wide variety of ferrous or brass metals, all protected against corrosion. Anodized aluminum knobs and caps. Durable, unitized, molded coils. Water/weather resistant coils are available with IP65 and IP69 rated connectors. Coils are rated for continuous duty operation.

**Standard Plating:** Standard valves come with zinc plating that meets ASTM B633 specifications. Type III (HydraForce PLT005) clear plating has a rating of 12 hours minimum to red rust on any surface. Type II (HydraForce PLT006) yellow plating has a rating of 96 hours minimum to red rust.

**Corrosion-Resistant (G) Plating:** Corrosion-resistant plating has a rating of 1000-hours minimum to red rust on any surface. HydraForce conducts salt-spray testing according to ASTM Standard B117 on its corrosion-resistant zinc-nickel plating. This plating is light gray in color and may have yellowish or purple hue that may vary from cartridge to cartridge.

RoHS compliance: HydraForce valves meet RoHS environmental requirements restricting the use of cadmium, quicksilver, lead, hexavalent chrome, polybrominated biphenyl (PPB) or polybrominated diphenyl ester (PPDE) in products, components and packing materials.

HyPerformance™ Cartridge Valves

**Cartridge Valve:** Steel with hardened work surfaces to prevent scratching and wear; zinc-plated exposed surfaces. Freemachining, low carbon steel, such as 12L14 is typically used. Where needed, higher grade, heat-treatable steel, such as 86L20, or higher strength UNS 1144, is used.

**Internal Cartridge Components:** Hardened precision poppets, seats, spools and cages for long life and low leakage. Freemachining, low carbon steel, such as 12L14 is typically used.

**External Cartridge Components:** Adjustment screws are constructed of a wide variety of ferrous or brass metals, all protected against corrosion. Anodized aluminum knobs and caps. Durable, unitized, molded coils. Water/weather resistant coils are available with IP65 and IP69 rated connectors. Coils are rated for continuous duty operation.

**Corrosion-Resistant (G) Plating:** Corrosion-resistant plating has a rating of 1000-hours minimum to red rust on any surface. HydraForce conducts salt-spray testing according to ASTM Standard B117 on its corrosion-resistant zinc-nickel plating. This plating is light gray in color and may have yellowish or purple hue that may vary from cartridge to cartridge.

RoHS compliance: HydraForce valves meet RoHS environmental requirements restricting the use of cadmium, quicksilver, lead, hexavalent chrome, polybrominated biphenyl (PPB) or polybrominated diphenyl ester (PPDE) in products, components and packing materials.
**OSHA compliance:** All HydraForce products meet requirements limiting the use of hazardous materials as identified in OSHA Standard 1910.1200(g).

**Solenoid Valve Coils (E-Coils)**

**Coil Shell:** Rugged external steel shell provides exceptional protection against physical damage, ensuring durability under harsh operating conditions. UNS 10060, SAE-AISI 1006-AK draw quality sheet steel is used for 8- and 10-size E-coils. salt-spray rated for 1000 hours per ASTM B117 specifications.

**Coil Windings:** Copper wire per NEMA Standard MW 1000.

**Connectors:** ASTM B 36 Alloy 260 half hard temper yellow brass.

**Manifolds and Valve Bodies**

**Aluminum:** Anodized high-strength aluminum alloy, rated to 210 bar (3000 psi) for a minimum of one million impulse cycles. Standard aluminum housings have a thin, clear-coat anodized finish which enhances quality by providing increased surface hardness, improved surface finish and increased corrosion-resistance. Anodized aluminum is easier to deburr and clean, which results in an overall better appearance.

**Cast iron:** Cast iron manifold housings can be custom ordered to fit the needs of a specific application.

**Ductile Iron:** Ductile (nodular cast) iron manifolds and valve housings are rated for pressures up to 345 bar (5000 psi). Zinc-plated for corrosion-resistance and surface sealing.

**Seals**

**Buna N (Nitrile) seals:**
Temperature range (per ASTM Standard D2000/SAE J200) -40 to 100°C (-40 to 212°F). Durometer is 70. High durometer nitrile seals are 90. O-rings are black in color. Cartridges with Buna N seals will also contain backup rings, which may be PolyTetra FluorEthylene (PTFE), Teflon®, Hytrel® or Polymyte.

**Fluorocarbon seals:**
Temperature range (per ASTM Standard D2000/SAE J200) -26 to 204°C (-15 to 400°F). Durometer is 75 or 90, depending on the application. O-rings are brown in color. Cartridges with fluorocarbon seals will also contain backup rings, which may be PolyTetra FluorEthylene (PTFE), Teflon®, Hytrel® or Polymyte.

**Polyurethane seals:**
Temperature range (per ASTM Standard D2000/SAE J200) -54 to 104°C (-65 to 225°F). Durometer is 90. O-rings are off-white in color. Cartridges with polyurethane seals will also contain backup rings, which may be PolyTetra FluorEthylene (PTFE), Teflon®, Hytrel® or Polymyte.

**PPDI Urethane seals:**
Temperature range (per ASTM Standard D2000/SAE J200) -54 to 135°C (-65 to 275°F). Durometer is 90. O-rings are yellow in color. Urethane seals for HyPerformance™ cartridge valves have a distinctive “D” shape that provides an effective seal without the use of backup rings.

---

**How to Order A HydraForce Valve**
The HydraForce model code is the key to specifying the right cartridge valve for your application.

**How To Specify a Material When Ordering**
Material choices are listed under each option. If in doubt, contact HydraForce Customer Service.

In North America, South America, and Asia, call 1 800 682-6875. In the USA, call 1-847-793-2000 In China, call +86-519-6988-1200. Email: sales@hydraforce.com

In Europe, call +44-121-333-1800 or Email: sales.uk@hydraforce.com