

TECHNICAL SPECIFICATIONS

Modena, 03/07/2025

MATERIALS

CARTRIDGES AND INTERNAL COMPONENTS: Cartridge bodies are manufactured from high grade cold drawn steel bar, all of the external parts are zinc plated for longer durability in challenging environments. The valve's internal working parts are hardened and ground (or lapped) for maximum performance and durability.

MANIFOLDS: Cartridges, parts in body valve manifolds and integrated circuit blocks are manufactured from high strength aluminum bars and high quality steel. As a standard, steel manifolds are always zinc plated (Crome 3 treatment) whilst aluminum bodies can be anodized upon request. For complete specifications and compatibilities, please consult our Engineering department.

For pressures above 210 bar we recommend using steel bodies. In most cases the aluminum bodies are strong enough, but if transient peak pressures are frequently encountered, there is the possibility of fatigue cracks.

COILS: the external encapsulating material of our coils is made of class H thermoplastic compound as well as internal copper wire.

PORTS

The standard port dimension on our valves, when not flanged, is BSPP size, ranging normally between G1/4" and G1-14". SAE 'O' Ring and NPT ports are available on request, as well as special flange dimensions.

SEALS, BACK-UP RINGS AND SLIDE RINGS

We use Acryl-Nitrile Butadiene NBR (BUNA-N) seals as standard for temperatures between -30°C and +100°C. Viton seals or other compounds are available on request.

Back-up rings and slide rings are made of reinforced poly-tetrafluoroethylene (PTFE).

STORAGE OF NEW VALVES

The valves must be stored in their original plastic envelopes or cartoon boxes. In a dry, dust-free atmosphere, free of corrosive agents, with a low moisture content and no large variations in temperature. They should not be exposed to direct sun light or sources of heat or ozone (as this could cause the fast wearing of valve seals). Storage temperature must be between -20°C and +50°C.

HANDLING AND INSTALLATION OF VALVES

We recommend the installation and the use of our valves be carried out by expert and qualified people with perfect knowledge of the product. AFT will not be responsible for improper use of its products. For any clarification, please contact AFT sales network.

The valve handling must be done in accordance with the weight of the box and of the valve itself, for more information please refer to your Country rules. Valves over a specific weight are equipped with threads where a hook can be installed; in this way the valve can be attached and lifted using mechanical devices.

FLUIDS AND WORKING TEMPERATURE RANGE

The recommended fluid is mineral oil based fluid, such as HL type (DIN 51524 part 1) or HLP type (DIN 51524 part 2) with an operating viscosity between 10 and 380 cSt. High viscosity and low temperatures may lead to a slower valve response than in warm oil conditions.

For water based fluids, such as 95/5 and 60/40 emulsions, please consult AFT sales network.

Fluid working temperatures should be maintained between -30°C and +100°C. For other working conditions, please consult AFT sales network.

FUNCTIONAL TEST

All the valves we sell are subjected to functional tests. The tests are carried out using ISO VG 46 hydraulic oil (viscosity of 46cSt at 40°C) and with oil temperature between 30 and 40 °C.

FILTRATION

Our valves are precision-machined mechanical components: the majority of valves failures (during normal working conditions) occurs due to hydraulic circuit contamination. We recommend the following filtration levels:

SYSTEM WORKING PRESSURE:	CONTAMINATION CLASS:	
> 250 BAR:	ISO 4406: 19/17/14	NAS 1638: 8
BETWEEN 100-250 BAR:	ISO 4406: 20/18/15	NAS 1638: 9
< 100 BAR:	ISO 4406: 21/18/16	NAS 1638: 10

INTERNAL LEAKAGE

Many of our valves have a leak proof seat design: this means that the maximum allowed oil leakage value is 1 cc/min (about 15-20 drops/min) measured with 46cSt oil at 40°C at the maximum permitted pressure. However, normal leakage is found to be less than 10 drops/min and tends to decrease or disappear after few seconds of rest. These are within the acceptable limits, note however that each type of valve has different performances depending on its design: please refer to our Engineering dept. for information about each valve type.

VALVE SETTING AND TAMPERPROOF DEVICES

SETTING: Our valves are supplied Factory set as stated on the corresponding catalogue page. The adjustment range and maximum setting figures shown on the catalogue are the safe limits according to each valve specific design: in the majority of cases higher or lower values can be attained. Any setting changes should be approved in writing prior by our Engineering dept. Any setting change must be carried out using an appropriate gauge or pressure/flow measuring equipment.

TAMPERPROOF: The majority of our cartridges and parts in body valves have the possibility to be equipped with a plastic tamperproof cap to prevent any undesired modification of valve setting: please refer to each catalogue page for the choice of the correct cap. On request, valve can be supplied already Factory set and sealed.

CARTRIDGE VALVE INSTALLATION

The correct machining of cavities is critical in ensuring the best performance of our cartridges. Cavity tools are available for sale and cavity drawings can be found in the specific section of our catalogue or requested from our Engineering dept.

To correctly install cartridges into their cavity, please follow this procedure:

- Check that external seals and back-up ring are correctly fitted and without damage;
- Ensure the cavity and cartridge body are clean and without any visible contamination;
- If necessary, immerse cartridge body into clean oil to take away any impurity and to lubricate the seals;
- Screw the cartridge into its cavity by hand, until mechanical contact is reached, being sure that during tightening that there is no abnormal friction between the cartridge and its cavity;
- Tighten the cartridge with a calibrated torque wrench applying the correct torque as specified on the corresponding catalogue page.

TORQUE FIGURES

So as to ensure correct cartridge behavior and to prevent any internal friction the correct torque must always be applied when fitting cartridges into their cavities: the correct torque values can be found on each cartridges' catalogue page.

COILS

ED RATE: All our coils are rated ED 100%, they can remain 100% energized through out the working cycle, provided the nominal voltage and maximum ambient temperatures are not exceeded.

TEMPERATURE CLASS: As standard the encapsulating material and copper wire are rated CLASS H: this means that the ambient temperature + temperature rise due to coil operation cannot exceed 180 °C. Class F coils are available on request (maximum 155 °C). The external surface of the coil can easily reach very high temperatures after long energizing period (80-100°C): Particular care must be taken to avoid accidental injuries to workers and operators. To prevent premature burning of the coils, it is requested that coils are installed in such a way to aid air ventilation around them and thus preventing excessive heating of the surrounding ambient.

IP PROTECTION CLASS: The standard insulation class of our coils is IP65, provided that all the seals between coil and solenoid cartridge tube/nut and between coil and connector are correctly fitted. Coils with Deutsch connector are rated with an IP69K insulation class.

INLET VOLTAGE: Our coils normally accept inlet voltage fluctuations of between $\pm 10\%$ without any compromise to normal functionality (unless specified on the coil catalogue page). If specific inlet voltages are required, please refer to our Engineering dept.

POWER SUPPLY: Our solenoid operated cartridges are designed to operate with DC (direct current) power supply: in case of AC (alternate current) applications, please apply between power supply and coil a current rectifier and use the proper RAC (rectified alternate current) coil.

ENVIRONMENTAL CARE AND PRODUCTS DISPOSAL

AFT products are made mainly with metallic materials; steel, aluminum, cast iron and plastic materials (ABS, PTFE, NBR) that can be recycled after being cleaned of hydraulic fluids if present.

Our packaging materials are made mainly of paper, cardboard, wood, plastic and polyethylene which can be recycled after being cleaned from hydraulic fluids if present.

Hydraulic fluids must be disposed of in accordance with the laws and procedures of each country.

During handling, installation and use it is necessary to avoid the dispersion of hydraulic fluid into the environment, in case of accidental dispersion it is necessary to follow your local rules.

MTTFd CERTIFICATE

The MTTFd value (mean time to dangerous failure) of a component is used to calculate the probability of a potentially dangerous failure of a machine or system.

Hydraulic products from Atlantic Fluid Tech are designed and manufactured in accordance with UNI ISO 13849-2:2012 principles; products technical sheets are showing all the information (maximum pressure, maximum flow, materials, ratings, operations...) that must be observed by designers and users of this products.

For hydraulic components (e.g., valves), a MTTFd value of 150 years can be presumed according to UNI ISO 13849-1:2016 if the fundamental and proven safety principles according to ISO 13849-2:2012 are adhered to as shown in table C.1 & C.2.

The MTTFd value can be estimated higher if the average number of annual operations (nop) is less than 1 million switching cycles.

An MTTFd value can be estimated according to the table below:

	Basic and well-tried safety principles according to ISO 13849-2:2012	Relevant Standards	Typical Values MTTFd (years) B10D (cycles)
Hydraulic components with $nop \geq 1,000,000$ cycles per year	Tables C.1 and C.2	ISO 4413	MTTFD = 150
Hydraulic components with $1,000,000$ cycles per year $> nop \geq 500,000$ cycles per year	Tables C.1 and C.2	ISO 4413	MTTFD = 300
Hydraulic components with $500,000$ cycles per year $> nop \geq 250,000$ cycles per year	Tables C.1 and C.2	ISO 4413	MTTFD = 600
Hydraulic components with $250,000$ cycles per year $> nop$	Tables C.1 and C.2	ISO 4413	MTTFD = 1200

The customer is responsible for the implementation and operations of the valves according to UNI ISO 13849-1:2016.

The latter is responsible for machine safety, including the correct design and evaluation of hydraulic valves used in safety-related parts of control systems. As a result, the customer is responsible for ensuring compliance with normative and statutory requirements in the countries concerned.