

Quick-acting couplings – plain and simple

Heinz Birmele, Senior Engineer

For conventional applications as well as for new construction concepts, Angst+Pfister offers an extensive assortment of quick-acting couplings. Conformity to international standards and guidelines as well as the realities of the market are decisive factors in selecting the appropriate type of coupling for your purposes. The following article on these important aspects also aims to clarify the sometimes confusing terminology used with regard to couplings.

For new applications, the choice often goes to flat-sealing, ecological hydraulic couplings. Particularly in sensitive areas, this solution has a bearing on safety and is expressly demanded by customers. However, demand for replacement parts in existing constructions primarily requires interchangeability. In many cases, a simpler construction architecture creates advantages.

Construction principle and standardization

Flat sealing

Flat-sealing quick-acting couplings are designed to be practically free of dead space, as is the case with FLAT-STAR® couplings. They conform to the ISO 16028 standard and reliably retain fluids during coupling and decoupling, thus preventing any dripping. The US Hydraulic Tool Manufacturers Association (HTMA) and the National Fluid Power

Association (NFPA) issue performance and interchangeability recommendations for only a few sizes and pressure levels. How relevant the recommendations are has to be clarified case by case.

Conventional sealing

The self-closing valve integrated in a jack and sleeve consists of a ball in the simplest case. The version with seat valve and flexible gasket offers sealing advantages, particularly at low pressures. Interchangeability and performance specifications are standardized under ISO 7241-1. Series A of this standard is used predominantly in Europe, and series B pertains primarily to couplings in the USA.

Dimensions

The performance specifications of quick-acting couplings are determined in conjunction with their dimensions.

- **Size**
The term size is a standard today for dimensions independent of the connection (with or without thread):
– according to ISO 16028 for flat-sealing couplings
– according to ISO 7241-2 for conventional sealing couplings
- **Nominal width**
Comparative designation that is mostly identical to the effective diameter.
- **Effective diameter**
This measurement used for quick comparison of flow rates corresponds to the diameter derived from the smallest flow-rate cross section. We recommend consulting the pressure loss diagram, which also takes the construction-dependent properties of the coupling into consideration.

Flow capacity and loss of pressure

As a selection criterion, use either the nominal values according to the standards or the specifications according to the pressure loss diagram.

- **Nominal flow capacity**
Dimension-dependent reference value measured according to ISO 7241-2.
- **Pressure loss at nominal flow capacity**
Pressure difference between entry and exit measured according to ISO 7241-2.
- **Test flow capacity**
Maximum flow rate according to ISO 7241-2.

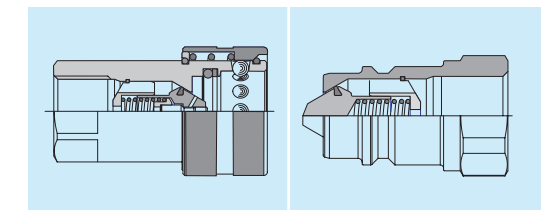
Pressure designations

The operating and nominal pressures of uncoupled sleeves and jacks are relatively low. Uncoupled parts of the coupling should normally not be under pressure because they cannot replace a stop valve.

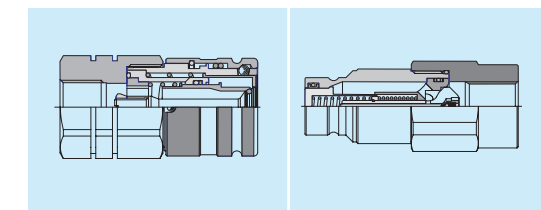
- **Nominal pressure coupled and uncoupled**
Values according to ISO 4399 with safety margin four times greater than bursting pressure.
- **Maximum operating pressure coupled and uncoupled**
Peak pressure with safety margin three times greater than bursting pressure.
- **Residual pressure**
Residual pressure means the pressure that remains in the system or, for example, the pressure generated by the heat expansion of the fluid. It greatly increases the required coupling force and is reduced by means of an integrated pressure relief valve during the coupling process.

Actuation force

- **Coupling force**
Coupling force of quick-acting couplings is the axial force required for the coupling process. For screw couplings, torque is also specified.
- **Decoupling force**
Decoupling force of quick-acting couplings is the axial force during the pressureless decoupling process; for screw couplings it corresponds to the torque. Decoupling under pressure must absolutely be avoided because uncontrolled pressure surges can cause damage.



Conventionally sealing jack and sleeve



Flat-sealing jack and sleeve

Conclusion

The more you know about the actual operating conditions, the more accurately you can select a quick-acting coupling with regard to its suitability in practical use. The explanations above are not exhaustive. Other design parameters such as number of cycles, pulse checks, weight, leakage, air enclosure while coupling, operating temperature and throughput fluid are not mentioned here.

Order our "Quick-Acting Couplings" catalog or talk to our specialists about your coupling needs. We would be happy to advise you, in our offices or onsite at your premises.

