

# Yale

## HYDRAULIC JACKS & TOOLS



# O F F I C E

## Why hydraulics?

Hydraulics is the kind of power transmission which allows the greatest density of forces. There is no other kind of power transmission that will transmit comparable high forces with the same construction size.

## Hydraulic tools

Hydraulic tools are a special type of power tools, which can be used for general assembly and repair jobs with preferably high force in lowest spaces.

Simple applications, clearness of the programme in line with robustness, short-term deliveries and universal operation possibilities have made Yale hydraulic components indispensable tools also for elaborate functions.

The unlimited power of hydraulic tools is used in applications like lifting, levelling and positioning of heaviest loads, installations of machines, assembly of complex structures as well as in general repair of maintenance jobs.

The components can also be operated in fixtures for clamping, testing, pressing, extracting, crimping, cutting, riveting and many more.

## How to reach high forces in hydraulics?

area	x	pressure	=	force
effective piston area	x	system pressure	=	force
cm <sup>2</sup>	x	bar	=	daN

Example: Hydraulic cylinder YS-10/

14.3 cm <sup>2</sup>	x	700 bar	=	10010 daN
			=	100 kN
			=	10 t

## Linear conversion of pressure force

The above formula shows that pressure forces can be converted linearly.

Example:

A 10 ton cylinder presses at:

700 bar	-	100 kN	=	10 t
350 bar	-	50 kN	=	5 t
100 bar	-	14 kN	=	1.4 t
1 bar	-	0.14 kN	=	0.014 t

## INFO

Der Systemdruck bestimmt die Kraft des Hydraulikzylinders. Die Fördermenge bestimmt die Ausfahrgeschwindigkeit.

## Basic terms in hydraulics

### Pressure

is the system pressure generated by the pump, which, however, can also be produced by an external power source, which acts on the hydraulic cylinder.

### Force

is always the pressure transferred by the hydraulic cylinder (only with counterpressure).

### Stroke

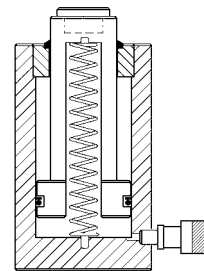
is the travel distance to be achieved by the force (no-load stroke, loaded stroke, return stroke).

### Piston travel speed

Is the time, in which the piston of the hydraulic cylinder is to pass a certain travel distance (stroke) (no-load stroke + loaded stroke, return stroke).

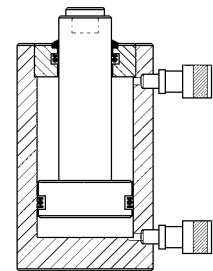
### Hydraulic cylinders

are available in many different designs, however, with only two basic function principles:



#### single-acting

The piston travel is achieved via hydraulic pressure and returned by spring activation (pressure build-up in one direction only).



#### double-acting

The piston travel is achieved via hydraulic pressure in both directions. (Push forces and pulling forces are possible).



## Hydraulic hand pumps

The function of a hydraulic hand pump is to convey hydraulic oil (no-load stroke) and to generate pressure, which will be converted by the hydraulic cylinder into force (loaded stroke). Hydraulic hand pumps are independent from energy and can be used in every-day applications. They are easily portable and render an extremely high power generation in connection with a corresponding hydraulic cylinder.

Hand pumps require certain manpower and are often replaced by motor pumps in case of permanent duty and high oil quantities, respectively.

## Hand pumps are distinguished by:

1. oil displacement volume (1<sup>st</sup> stage / 2<sup>nd</sup> stage).
2. the function of the hydraulic cylinder: single-acting / double-acting.

## Motor pumps

transmit an oil flow as soon as the pump unit is driven by the electric motor. Contrary to hand pumps, the oil flow is also available when the hydraulic cylinder is not activated (e.g. during work breaks).



## Hydraulic valves

Valves are used in hydraulics to control the oil flow (generated by either hand or motor pump) in terms of direction, pressure and oil volume.

## Directional valves

are required to control the direction of the oil flow and thus the work motions of the connected hydraulic cylinder (advance - hold - return).

Depending on the type of pump and cylinder, 2-, 3- or 4-way valves may be employed.

3/3-way valves for single-acting cylinders

4/3-way valves for double-acting cylinders

Controls are available with either manual or electro-magnetic valves (the latter with remote cable control).

## Pressure valves

are employed to limit the system pressure in a hydraulic system or within a part of the oil circuit. Pressure valves or pressure relief valves are also installed as safety devices in order to avoid excessive increase of the system pressure beyond a given value.

## Shut-off and throttle valves

are used to easily shut-off hydraulic lines by hand. On account of their sensible control mode, these valves can also be applied to throttle an oil flow and thus to control the piston advance at both lifting or lowering of the load.

## Safety check valves

are used for those applications where pressure drops must be avoided.

## Pressure switch

can be set to any pressure value in order to switch on/off parts of the hydraulic circuit.

## For your safety

Hydraulic units are extremely robust and durable. Nevertheless you should observe the following instructions for your own safety and to increase the life expectancy of the product:

- Never exceed the max. pressure (capacity) of the hydraulic units.
- Avoid eccentric loading of the piston.
- The load must always be positioned centric and parallel on the piston. Avoid point loading!
- Never pass under a raised load, if this is not supported additionally.
- Hydraulic units must be kept clear of heat (e.g. during welding).
- Protect hydraulic hoses against damage and strong kinks. Hydraulic hoses should lie freely in a wide curve. Avoid tensile load.

## Eccentric loading

In order to obtain a long life expectancy, hydraulic cylinders series YS, YLS, YFS, YCS, YCH, YH and YPL are manufactured from chromium-molybdenum steel, the cylinder housings and piston rods are hardened and tempered and provided with bronze guides.

Generally, hydraulic cylinders should not be loaded eccentrically, as this can lead to reduced lifetime. In practice, a lateral loading cannot be fully avoided. In this case the maximum system pressure and the stroke of the cylinder should only be used by 50%. Ensure that the load always rests on the total area of the steel saddle and the piston, respectively. Also ensure that the entire bottom area of the hydraulic cylinder always stands on a level, sustainable ground surface.

This applies especially to flat cylinders!

## Repairs

Repair and maintenance should be performed by qualified personnel only. Make sure to use original spare parts only.



# O F F E R

## Hydraulic cylinders with Yale Chro-Mo-Design

Yale hydraulic tools are designed for professional operation. A tool is only as good as its basic material. Therefore, our cylinders are manufactured from high quality chromium-molybdenum steel and are heat-treated.

### Double bronze bearings

Practice has shown that hydraulic cylinders used as a tool in workshops or on construction sites are frequently subjected to eccentric loading. Yale hydraulic cylinders are provided with double bronze bearings on the plunger, which minimizes friction between plunger and body during lateral loading.

### Hard chromium-plated piston

Offers excellent protection against mechanical damage and corrosion. Excellent sliding characteristics in conjunction with the upper bronze bearing in the stop ring.

### Metric mounting threads and standard parts

To facilitate the installation of hydraulic cylinders in jigs and fixtures and auxiliary structures. The metric standard throughout the entire series simplifies service operations and repairs. Cylinders carry the full load even under maximum operating pressure.

### Stop ring carries full pressure

As a safety factor the stop ring on all Yale hydraulic cylinders carries the full load even under maximum operating pressure.

### Delivered ready to use

Yale Hydraulic cylinders are delivered ready to use incl. female coupler half, hardened saddle and mounting threads; larger cylinders come with carrying handle or transportation lugs. This also applies to customised combinations which are always supplied fully assembled.

Hardened alloy steel saddle

Metric mounting threads in cylinder base, plunger and cylinder collar (depending on series)

Two bronze bearings minimize friction even in cases of eccentric loading

# INFO



Dirt wiper protects against dirt

Stop ring prevents over-stroking of the piston up to full operating pressure

Hard chromium-plated plunger

Piston and ...

... cylinder housing are made from chromium-molybdenum steel and are heat-treated.

Female coupler half CFY-1 (incl. dust cap)