USEFUL PAGES

In the following pages you'll find information and advise concerning the safe use and the correct selection of your EUROPRESS High-pressure Hydraulic Equipment.
Please refer to Sections **How to choose a cylinder** (page 9), **How to choose a pump** (page 44) and **Components of an hydraulic system** (page 46). We hope these pages are helpful but should you require more information, our Technical Department is at your disposal to study special projects or applications to provide a cost effective and convenient solution.

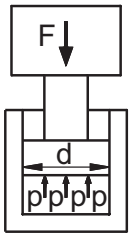
BASICS FOR HYDRAULIC CALCULATIONS

The calculation examples given serve as a basis for the use of hydraulic systems.

1. FORCE OF AN HYDRAULIC CYLINDER

The force of an hydraulic cylinder results from the pressure in the cylinder, p, on the piston of the cylinder

The formula: **F**(kg) = **p**(bar). **A**(cm²) [being = $\frac{10N.m}{s^2}$]
means:
F = force acting on the cylinder in kg
p = operating pressure in bar
A = the cylinder effective area in cm2 which is calculated from the piston diameter:



$$\mathbf{A}(cm^2) = \frac{d(mm)^2.\pi}{400} \quad (\pi = 3{,}1416)$$

EXAMPLE 1:
A **CGG100P50** cylinder is required to lift a load of 72 t.
What operating pressure is required?

$$\mathbf{A}(cm^2) = \frac{d(mm)^2.\pi}{400}$$

with piston diameter **CGS100P50**

→ **d** = 130 mm

$$\rightarrow \mathbf{A} = \frac{130^2.3{,}1416}{400}\ cm^2 = 132{,}7\ cm^2$$

the result of **F**(kg) = **p**(bar). **A**(cm²) after its inversion, is

$$\mathbf{p}(bar) = \frac{F(Kg)}{A(cm)^2} \text{ being F = 72 t = 72.000 kg}$$

$$\rightarrow \mathbf{p} = \frac{72.000}{132{,}7}\ bar = 542\ bar.$$

The required operating system is 542 bar.

EXAMPLE 2:
A **CMI10N100** cylinder lifts a load; the gauge shows an operating pressure of 520 bar. What is the weight of the load?

$$A(cm^2) = \frac{d(mm)^2.\pi}{400}$$

With piston diameter **CMI10N100**
→ **d** = 45 mm

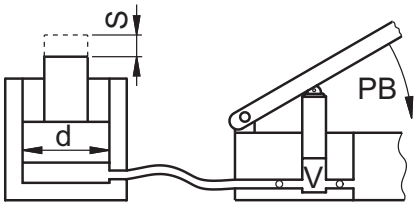
$$\rightarrow \mathbf{A} = \frac{45^2.3{,}1416}{400}\ cm^2 = 15{,}9\ cm^2$$

F(kg) = **p**(bar). **A**(cm²)
F = (520 . 15,9) kg = 8270 kg

The lifted load has a weight of 8270 kg.

2. ACTUATING PUMPS

When an hydraulic cylinder is operated by a hand pump, the cylinder plunger moves a certain distance per pump actuation. This distance depends on the cylinders effective area and on the pump's oil flow per stroke. When two-speed hand pumps are used, the low pressure oil flow **VLP** applies for cylinder movements without load and the high pressure oil flow **VHP** applies for cylinder movements with loads.



The formula: $\mathbf{S}(mm) = \frac{V(cm^3).10}{A(cm^2)}$

means:
S = cylinder's shift in mm
V = pump's oil flow per stroke in cm³
A = cylinder area in cm².

EXAMPLE 3:
A **CMI10N100** cylinder is operated by a **PL131** hand pump. What is the distance the supported load moves per pump actuating?

→ **A** = 15,9 cm² (see example 2)

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$$\mathbf{S}(mm) = \frac{V(cm^3).10}{A(cm)^2}$$

PL131 having an oil flow per stroke of

→ **V** =3,4 cm^3

→ $\mathbf{S} = \frac{3,5.10}{15,9}$ mm = 2,2 mm

The supported load moves 2,2 mm per pump full stroke actuation.

EXAMPLE 4:
A **CGG100P50** (stroke S = 50mm) is operated by a **PL162** hand pump. A non-load stroke of L = 30 mm has to be accounted for. How many pump actuations **PB** are necessary to extend the cylinder completely?

→ **A** = 132,7 cm^2 (See example 1)

Meaning for the non-load stroke $\mathbf{S}_{BP}$ (mm) = $\frac{V_{BP}(cm^3).10}{A(cm^2)}$

PL162 having a LP-oil flow per stroke of

→ $\mathbf{V}_{BP}$ = 32cm^3

→ $\mathbf{S}_{BP} = \frac{32.10}{132,7}$ mm = 2,4 mm

The number of pump actuations in the non –load mode is calculated by way of non-load stroke divided by the movement covered per pump actuation:

$\mathbf{PB}_{BP} = \frac{L(mm)}{S_{BP}(mm)} = \frac{30}{2,4}$ = 13 pump actuations

Meaning for stroke under load: $\mathbf{S}_{AP}$ (mm) = $\frac{V_{AP}(cm^3).10}{A(cm^2)}$

PL162 having a LP-oil flow per stroke of

→ $\mathbf{V}_{AP}$ = 3 cm^3

→ $\mathbf{S}_{AP} = \frac{3.10}{132,7}$ mm = 0,23 mm

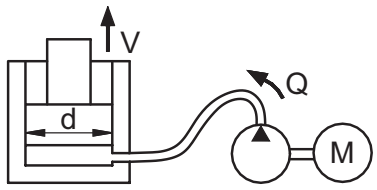
The number of pump actuations under load is calculated from the remaining stroke divided by the distance covered per pump actuation:

$\mathbf{PB}_{AP} = \frac{H(mm) - L(mm)}{S_{AP}(mm)} = \frac{50-30}{0,23}$ = 87 pump actuations

In total = $\mathbf{PB}_{BP}$ + $\mathbf{PB}_{AP}$ = 13 + 87 = **100 pump actuations.**

3. SPEED OF EXTENDING

The time an hydraulic cylinder needs for extending, being operated by an electric pump, depends on the cylinder effective area and on the oil flow of the electric pump. When two-speed pumps are used, the LP-oil volume $\mathbf{Q}_{LP}$ for cylinder movements without load and the HP-oil volume $\mathbf{Q}_{HP}$ for cylinder movements with load is to be put in.



The Formula: $\mathbf{v}(mm/s) = \frac{Q(l/min).166,67}{A(cm^2)}$

means:
v = speed of the cylinder in mm/s
Q = the oil flow of the pump in l/min
A = cylinder area in cm2

EXAMPLE 5:
A **CGG100P50** is operated by an electric pump **MEF10M31**. What is the cylinder's speed of full extension?

→ **A** = 132,7 cm^2 (see example 1)

$\mathbf{v}(mm/s) = \frac{Q(l/min).166,67}{A(cm^2)}$

having an oil flow **MEF10M31** | **Q** = 1,8 l/min

→ $\mathbf{v} = \frac{1,8.166,67}{132,7}$ mm/s = 2,2 mm/s.

The cylinder's speed of full extension is 2,2 mm/s.

UNITS OF MEASUREMENT

The details given in the present catalogue are expressed in the units of measurements of the international System currently in force.
The table below facilitates conversion into a commonly used equivalent systems of measurements.

1 bar = 0,1 MPa
1 bar = 10 N/cm^2
1 bar = 1,0197 kgf/cm^2
1 bar = 14,5 psi
1 MPa = 10 bar
1 N/cm^2 = 0,1 bar
1 kgf/cm^2 = 0,9806 bar
1 psi = 0,0689 bar

1 kN = 0,10197 t
1 N = 0,10197 kgf
1 N = 0,2248 lbf
1 ton (short) = 907,18 kg
1 ton (short) = 2000 lb

1 kW = 1,359 HP
1 HP = 0,735 kW

1 Nm = 0,10197 kgf·m
1 lbf·ft = 0,13825 kgf·m

1 gal (UK) = 4,546 l
1 gal (US) = 3,785 l
1 in^3 = 16,387 cm^3
1 in^2 = 6,451 cm^2
1 in = 25,4 mm

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SAFETY INSTRUCTIONS

MAINTENANCE AND USE INSTRUCTION

CYLINDERS

Always provide a solid support for the entire cylinder base area.

Make sure that the two areas on which the cylinder develop its force are sufficiently strong and non-deformable.

Never use cylinders without the saddle, as they distribute the load evenly and prevent damage to the piston.

The cylinder saddle must be in contact with the load and the cylinder movement must be in axis with the load movement.

Avoid any lifting of off centred loads which could damage the cylinder. The use of a tilt saddle allows a misalignment of the load ± 5°.

To hold the load lifted use a needle or a pilot check valve in addition to the pump or power pack valve. In case the load has to be held over a long period use a cylinder with a safety lock nut.

Never work near the load supported only by the hydraulics. The safety lock nut of the cylinders has to be continuously screwed down onto the body of the cylinder during the lifting operation.

Never place any part of your body under the load and for additional safety support the load mechanically.

Keep your hydraulic equipment away from temperatures above 65°C (150°F).

EPP components have been treated against corrosion. Nevertheless in case of operations in very humid areas or marine environments, please contact our Technical Department for more information.

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SAFETY INSTRUCTIONS

Avoid retracting the piston too quickly if it is still under load. A sudden retraction creates pressure shocks in the hydraulic circuit. Slowly turn the hand pump and power pack release valve. When 4/3 valves are used in a maintained position it is advised to insert a needle valve between the directional valve and the cylinder in order to have a controlled lowering speed of the load.

Never exceed the maximum working pressure indicated for any cylinder range.

Do not use any component with a load exceeding their nominal capacity. Always use a gauge to check the circuit pressure or tonnage.

EUROPRESS CYLINDERS HAVE BEEN DESIGNED WITH GREAT SAFETY MARGINS. NEVERTHELESS TO AVOID TO UNDERVALUATE THE LOAD TO BE LIFTED, ALWAYS CHOOSE A CYLINDER WITH AT LEAST 20% MORE CAPACITY THAN THE REQUESTED LOAD.

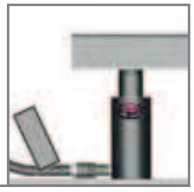
HYDRAULIC HOSES

Before connecting, clean the couplers properly and to avoid contamination use the dust caps when not connected.

Always keep the hoses away from the area under the load.

Only disconnect the cylinder from the pump when the rod has fully retracted.

Do not lift any hydraulic component by the hose



Do not kink hoses. The bending radius must not be under 70 mm. Do not walk over or drop heavy objects on them.

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SAFETY INSTRUCTIONS

PUMPS

Never refill the pump above indicated level and whilst the pump is connected to a partially extended cylinder.

We recommend to use EUROPRESS hydraulic oil only. Its viscosity and lubrification features guarantee the highest operational efficiency and a longer life of the equipment. The hydraulic oil temperature must not exceed 60°C (140° F). To operate at higher temperatures or with different fluids please contact our Technical Department.

Do not use any extension on the pump handle. Operate hand pumps is easy, when properly handled.

We recommend to read carefully EUROPRESS safety instructions before use.

Use your fingers to close the release valve, a tool could cause damage.

Use EUROPRESS hydraulic oil only, to keep the seals intact.

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QUALITY

QUALITY CERTIFICATION

Euro Press Pack has always been a Company very attentive to quality norms.

This means that both the design of our products than their manufacturing are planned considering the Good Manufacturing Practice . All necessary controls are made to grant our customers the highest possible quality standard. In this way the final product is produced and checked according to the defined procedures and this assures that the quality system is efficient, controlled and proved.

QUALITY SYSTEM CERTIFICATE ISO 9001:2008

Certification for design, manufacturing, marketing and repair of high pressure components

ENVIRONMENTAL SYSTEM CERTIFICATE ISO14001:2004

System certification for design and manufacture, through the various step of cutting, mechanical machining, surface treatments, painting, assembly, testing, packing and dispatch, sales and service of high pressure hydraulic fluid components.

ANSI B30.1

All cylinders comply to the standard laid down by the American National Standards institute (apart from CGS#P#, CGG#P#, and CGR cylinders).

EN 60204-1

The electric parts of the machines are made according the standard of EN 60204-1

SAE 100R10

The 700 bar hoses exceed this norm.

CE DIRECTIVES 2006/42/CE – 2006/95/CE – 2004/108/CE

All our power packs conform the CE norm on the machine directive, low tension and electromagnetic compatibility.

CE mark.

All EUROPRESS products meet the European safety directives.

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