MOVAX EXCAVATOR REQUIREMENTS

MOVAX Side-grip pile drivers, Piling hammers and Piling Drills - and MOVAX Manipulators - are designed to be operated and mounted on standard excavators and to be connected to the normal auxiliary hydraulic system of the excavator (for rail roaders and other carriers, please contact Movax Oy). MOVAX Multi-tool piling leaders are designed to be operated and mounted on standard excavators. In addition to normal auxiliary hydraulics, excavator bucket cylinder hydraulics can be utilized depending on the configuration.

The carrier to which the MOVAX is connected shall fulfill the following technical requirements, which are also the basis for any mechanical warranty provided by Movax Oy. It is recommended to measure the excavator auxiliary oil flow prior to selecting and installing the MOVAX piling and handling equipment.

EXCAVATOR HYDRAULIC REQUIREMENTS

1. GENERAL

The excavator hammer valve and boom-up valve shall be fed with separated oil pumps (1-pump connection).

Rationale: *When extracting with a 2-pump connection the boom-up is getting the same pressure as the hammer line. The MOVAX is typically operated with a pressure of 240–290 bar thus reducing the lifting force by 20–40% compared to operating the boom-up with a pressure of 350 bar.*

2. OIL FLOW RATE

The required oil flow rate to the MOVAX at the operating pressure is presented in table 1. The recommended oil flow rate is 10% higher than the required amount and always measured at the MOVAX operating pressure (shown in table 1). Note! the oil flow and pressure requirements varies for different MOVAX models.

Rationale: *The 10% margin in the oil flow rate is recommended because of other excavator or other carrier functions. The excavator or other carrier oil flow rate is normally presented at 0 bar pressure. The hydraulic pump performance curve is typically such that the oil flow rate drops when the pressure increases. Note! Required oil flow at the nominal operating pressure (as per table 1; for example SG-45 requires 141 l/min @ 280 bar(g)).*

3. OIL RETURN PRESSURE

The return pressure measured at the end of the stick with cold oil (20–40°C) should be **max. 15 bar**.

Rationale: *A too high return pressure will reduce the performance of the MOVAX piling equipment and could lead to, for example seal damages.*

Picture 1. Hydraulic and electrical connections

The return hose from the hammer line should be connected directly to the return filter of the hydraulic tank without any restriction, and thus never through the main valve as in the 2-way hammer line. Please make sure that your excavator has the hammer piping (auxiliary hydraulics) installed and that it is in a working condition before installing the MOVAX. Hoses and pipes shall be large enough for the oil flow required by the MOVAX. The required hose and pipe sizes are presented in table 1.

MOVAX SG-, TAD-, KB- and MPL-models require a separate drain line with a ½" hose directly to the excavator hydraulic tank without any restrictions. It is recommended to connect the drain line to the hydraulic tank return filter. The drain pressure measured at the end of the stick with cold oil (20–40°C) should be max 5 bar.

Table 1. Excavator (or carrier) hydraulic requirements

MOVAX model	Excavator class ton	Relief valve pressure setting, maximum bar(g)	MOVAX Nominal operating pressure bar(g)	Required oil flow to MOVAX l/min	MOVAX power kW	Minimum Excavator engine power, kW		Pressure pipe/ hose size minimum	Return pipe/ hose size minimum
						=> TIER III	TIER IV =>		
SIDE-GRIP PILE DRIVERS									
SG-15N	7–12	300	190	63	20	38	38	16 mm or ½"	22 mm or ¾"
SG-30N	13–16	350	280	90	42	65	70	22 mm or ¾"	22 mm or ¾"
SG-40N	17–21	350	280	120	56	85	90	22 mm or ¾"	30 mm or 1"
SG-45	20–24	350	280	141	66	100	120	30 mm or 1"	30 mm or 1"
SG-45V	20–24	350	265	150	66	100	120	30 mm or 1"	30 mm or 1"
SG-50	23–28	350	240	189	75	117	135	30 mm or 1"	35 mm or 1 ¼"
SG-50V	23–28	350	270	166	75	117	135	30 mm or 1"	35 mm or 1 ¼"
SG-60	28–32	350	275	189	87	135	160	30 mm or 1"	35 mm or 1 ¼"
SG-60V	28–32	350	270	193	87	135	160	30 mm or 1"	35 mm or 1 ¼"
SG-75	33–40	350	280	240	112	180	200	38 mm or 1"	42 mm or 1 ¼"
SG-75V	33–40	350	280	240	112	180	200	38 mm or 1"	42 mm or 1 ¼"
SG-80F	33-50	350	270	247	112	180	200	38 mm or 1"	42 mm or 1 ¼"
SG-80VA	33-50	350	270	247	112	180	200	38 mm or 1"	42 mm or 1 ¼"
PILING HAMMERS *				MIN-MAX					
DH-15	(20)23–30	350	150	80–120	30	45	55	22 mm or ¾"	35 mm or 1 ¼"
DH-25	(28)30–50	350	200	80–120	40	65	75	22 mm or ¾"	35 mm or 1 ¼"
DH-35	(33)35–50	350	250	80–120	50	80	90	22 mm or ¾"	35 mm or 1 ¼"
DH-45	(38)40–50	350	280	80–120	56	90	100	22 mm or ¾"	35 mm or 1 ¼"
PILING DRILLS									
TAD-32	24–35	350	280	150	70	110	130	30 mm or 1"	35 mm or 1 ¼"
KB-70S	(30) 35–50	350	350	100–200	58–117	90–180	105–210	30 mm or 1"	35 mm or 1 ¼"
MANIPULATOR									
MPM-4000	18 - 35	250-350	250	Max 60	33	50	60	3/8" or 1/2"	1/2" or 3/4"
MULTI-TOOL PILING LEADERS									
MPL with tooling									
Excavator class, required hydralic system parameters etc to be defined on a case-by-case basis.									

** excavator-mounted. please contact Movax Oy for mounting on MOVAX Multi-tool piling leader, piling rig or crane.*

NOTE! The selected excavator must meet the specified oil flow rate and pressure requirements. The excavator class (ton) and minimum excavator engine power (kW) are provided as a general guideline only.

In addition to the hydraulics, the stability of the excavator must be taken into consideration when determining the suitability of a specific excavator. Total weight of Movax equipment, quick coupler and pile shall not exceed lifting capacity mentioned in excavator's technical specifications. Working range must be kept by operator within the defined limits of stability at all times.

4. MAX PRESSURE SETTING

The pressure relief valve of the hammer line in the excavator must be set to the pressure presented in table 1.

Note! the pressure setting changes between different MOVAX models.

5. CONTROL OF THE HAMMER VALVE

The hammer valve of the excavator has to be controlled by the MOVAX control system (mControl+). The mControl+ LITE and mControl+ PRO utilises either proportional pilot valves, a PWM controller or a CAN pilot circuit/interface for the control of the excavator's auxiliary hydraulics.

NOTE! Please inform MOVAX Oy or MOVAX Oy's representative, if your excavator has a 12 V system.

6. HYDRAULIC QUICK HOSE COUPLINGS

If using hydraulic quick hose couplings at the end of the hammer piping, use only low resistance ones with a locking mechanism to avoid opening during vibration. Italian manufacturer's Stucchi VP21 1-1/4" couplers are recommended to be used for oil flows 150–250 l/min. For oil flows 90–150 l/min Stucchi VP17 1" couplers are recommended. These both coupler types can be supplied by Movax Oy upon request.

EXCAVATOR STABILITY REQUIREMENTS

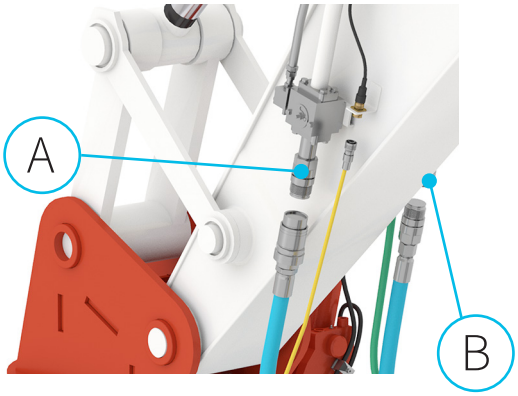
The stability of the excavator must be taken into consideration when determining the suitability of a specific excavator. The stability of a specific excavator can be determined based on the excavator manufacturer's 'Lifting capacity' chart or technical specification.

The total weight of the MOVAX equipment, adapter/quick coupler and the pile itself shall not exceed the lifting capacity mentioned in the excavator manufacturer's 'Lifting capacity' chart or technical specification. The lifting and/or working range must be kept by the operator within the specified limits of stability at all times. In addition to the stable operation it is also the explicit responsibility of the operator to adhere to all safety related instructions provided by both the manufacturer of the excavator (carrier) and Movax Oy at all times.

OIL FLOW MEASUREMENT

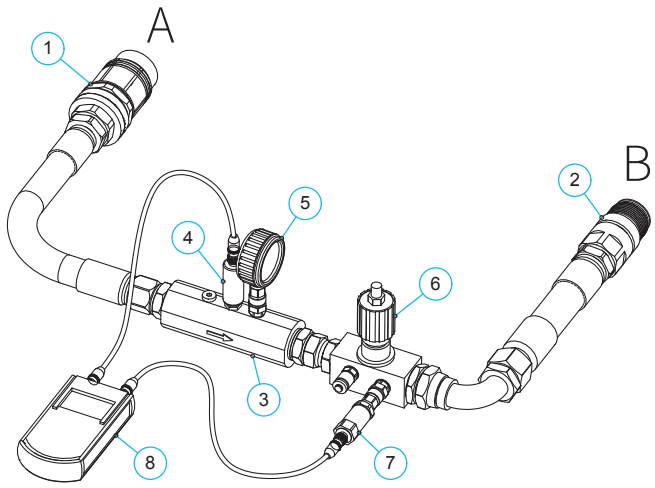
It is recommended to measure the excavator auxiliary oil flow prior to selecting and installing the MOVAX piling and handling equipment and MOVAX Control System in order to ensure the suitability of the excavator and the proper functioning of the MOVAX piling and handling equipment.

The oil flow shall be measured with an oil flow meter or tester. The oil flow meter (or tester) is connected between the pressure and return (to tank) lines.



Picture 2a. Connecting the flow meter

The oil flow shall be measured at 20 bar pressure intervals starting from 100 bar up to 350 bar (note! as a part of the measuring procedure the excavator relief valve pressure setting must be set to 350 bar with a tolerance of 335–350 bar). In addition, to the oil flow the return pressure shall be measured and recorded. The measured results shall be recorded (Flow test measuring protocol or report, table 2.).



Picture 2b. Connecting the flow meter

1	Pressure
2	Return to tank
3	Hydraulic oil flow turbine
4	Hydraulic oil flow sensor l/min
5	Hydraulic pressure gauge 0-400 bar (or pressure sensor) for main pressure
6	Hydraulic throttle valve (flow control valve)
7	Hydraulic pressure sensor 0-60 bar, 0-100 bar etc. (or pressure gauge) for return pressure
8	Hydraulic oil flow and pressure display

Table 2. Flow test report (model)

MOVAX

FLOW TEST REPORT

Date:
Performed by:

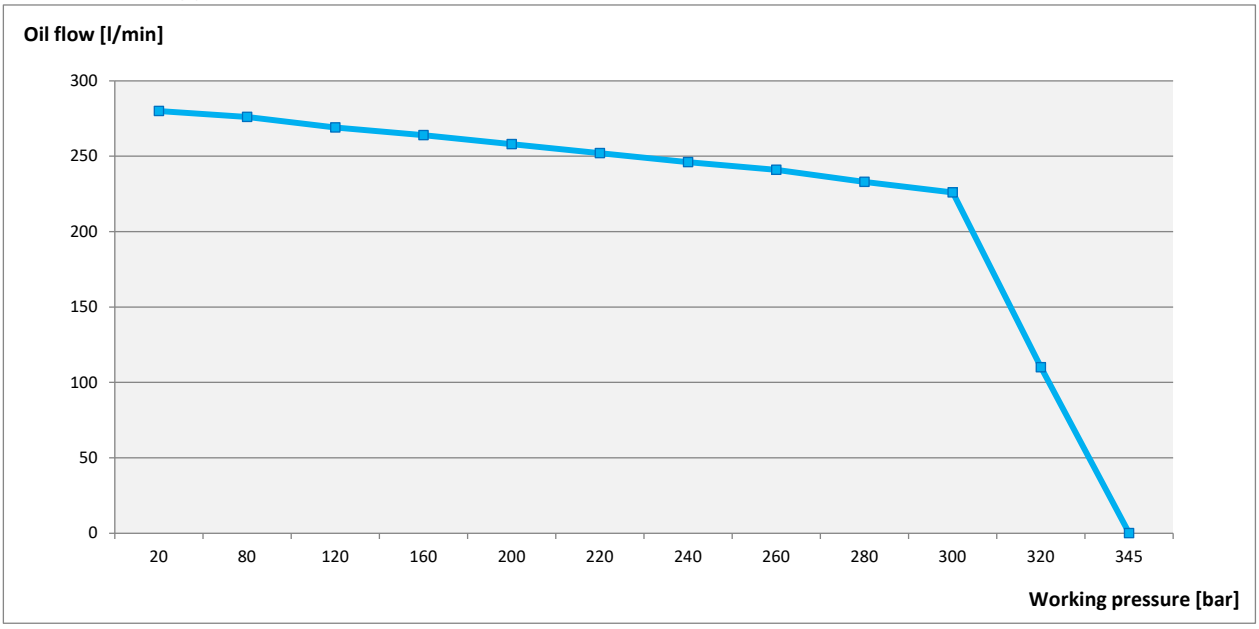
Customer	
Carrier	
make	
model	
year of manufacture	
operating hours [hrs]	
engine power [kW]	
Note!	

Flow test (measured data)

Working pressure [bar]	Oil flow [l/min]	Return pressure [bar]	Note!
20	280		
80	276		
120	269		
160	264		
200	258		
220	252		
240	246		
260	241		
280	233		
300	226		
320	110		
345	0		*relief working pressure

Note!
Relief working pressure* to be measured at 0 l/min oil flow.
Return pressure to be measured at MOVAX piling equipment nominal flow (please refer to 'MOVAX excavator requirements')

Oil flow vs working pressure



Movax Oy
Tölkkimäentie 10
FI-13130 Hämeenlinna, Finland
Tel. +358 3 628 070
Fax +358 3 616 1641
marketing@movax.fi
www.movax.com
Y-tunnus: 1031917-0
VAT No: FI10319170