

1.2 Technical data

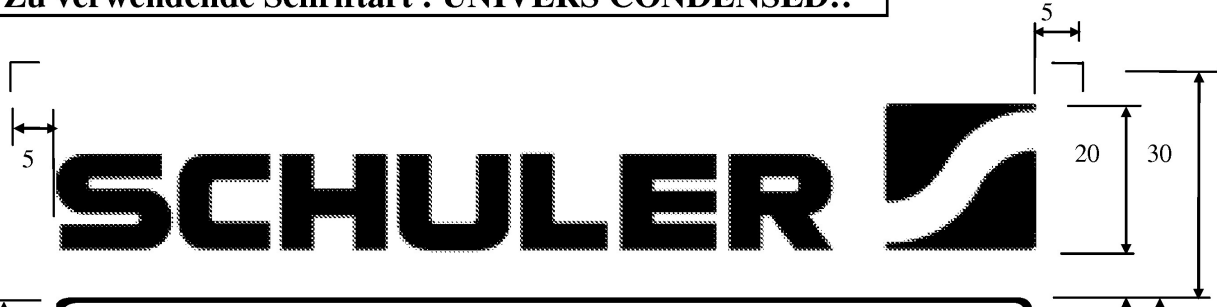
Serial No.: G/075941-01 Type: CHAPU-3600-3.6X2.4
 Year of construction: 2014 Customer: NCC University Bristol, England

Total press capacity	kN	36000
Nominal force	kN	36000
Slide adjustable range	mm	2400
Distance bolster plate - Slide TDC	mm	2800
Slide area (width x depth)	mm	3600 x 2400
Clear distance between the guides		
(left - right)	mm	3650
(front – rear)	mm	1250
Force bolster plate	kN	36000
Stroke bolster plate	mm	200
Working stroke	mm	100
Bolster plate area (width x depth)	mm	3600 x 2400
Die area min. (width x depth)	mm	3600 x 2400
Die height min.	mm	260
Weight of the die max.	kg	100000
Weight of the upper die max.	kg	50000
Main drive		
Power rating	kW	2 x 132
Pump rating	l/min., U/min.	4 x 115/1450
Speed		
Slide		
Rapid downstroke speed	mm/s	1000
Working speed at rated force	mm/s	35
Working speed max.	mm/s	40
Lower slide		
Working speed at 30000 kN	mm/s	1 - 40
Working speed at 36000 kN	mm/s	1 - 35
Return speed	mm/s	1 - 40
Stroke limitation / damping / manually / by motor		- / - / - / -
Drive on the press crown / below floor level		- / X
Admissible off-centre load of the slide		
from left to right (mechanical)	kNm	50
from front to back (mechanical)	kNm	50
from left to right (hydraulic)	kNm	10000
from front to back (hydraulic)	kNm	7000

Safety guard right / left			X / X
Light curtain front / rear			X / X
Light barrier right / left			X / X
Scanner die separation level			X
Weight of the machine	kg	approx.	260000
Total oil quantity	l	approx.	10500
Oil quantity initial filling	l	approx.	13000
Operating voltage	three-phase current	V	400
Control voltage	A.C.	V	230
Valve voltage	D.C.	V	24
Frequency		Hz	50

Schildgröße : 125 x 148 mm Dicke: 0,8 mm Radien: 1,5
 Schrift : schwarz Grund: Al. matt
 Befestigung : 4 x Zyl.- Schr. ISO 1207 - M3x8 - 89-250.002

Zu verwendende Schriftart : UNIVERS CONDENSED!!



7	⊕	SERVICE VOLTAGE	400 V THREE PHASE AC	⊕
8		FREQUENCY	50 Hz	7
8		CONTROL VOLTAGE	24 V DC / 230 V AC	
		VALVE VOLTAGE	24 V DC	2.8
7		RATED CURRENT	780 A	
		LINE FUSE	1000 A DELAY ACTION	
		MANUFACTURING-NO.	G/075941-01	
		CIRCUIT DIAGRAM-NO	75-912.652	
	⊕		75-956.584	⊕

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SCHULER SMG GMBH & CO.KG
 D - 68753 WAGHÄUSEL · GERMANY

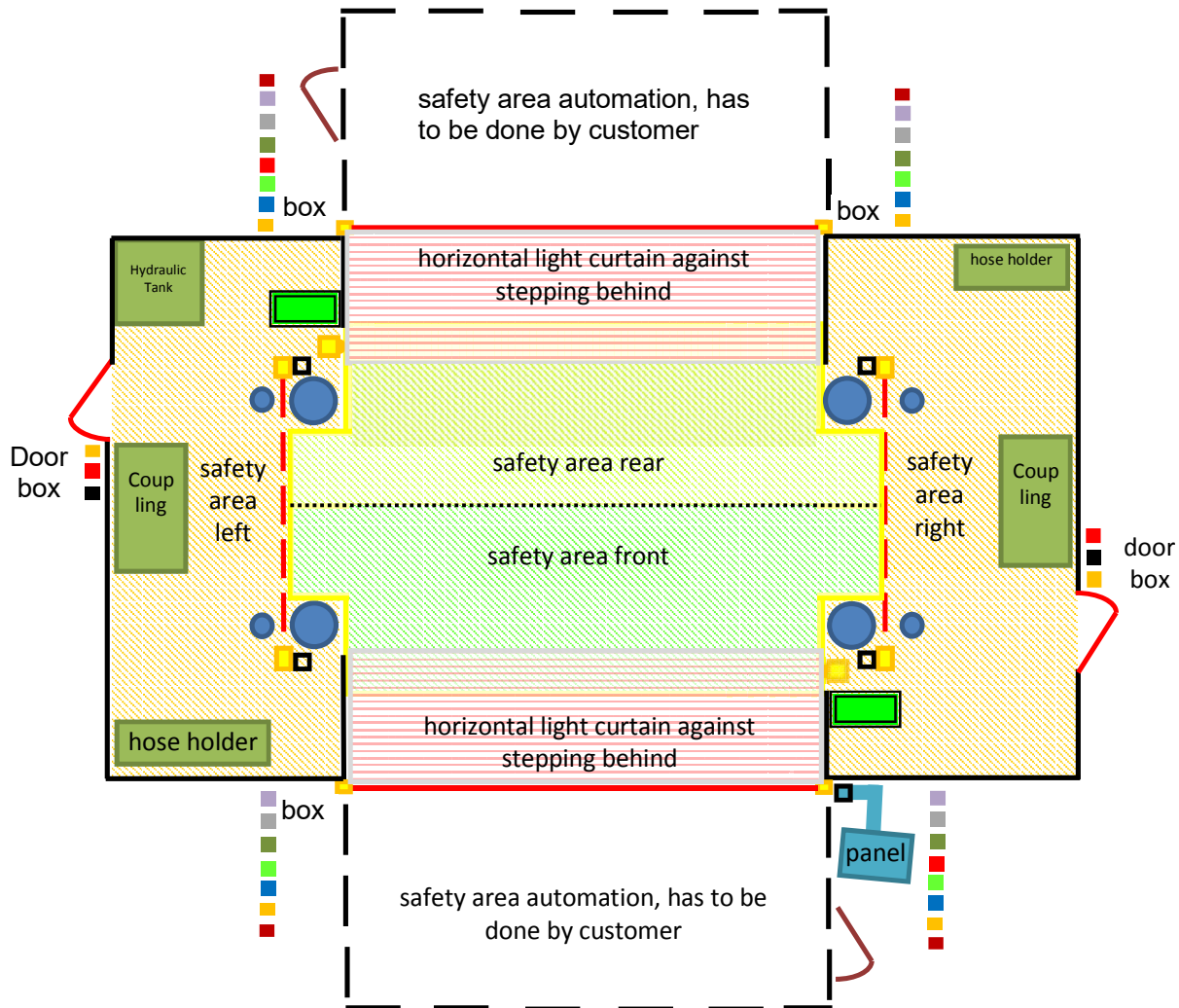
STAMMORIGINAL 75-946.850


















Abgeleitet von Ident Nr.

Index	Änderungstext		Name	Name
	SCHULER SMG	Identnummer 75-956.584	F 4	Maßstab % Blatt 1 von 1
Be-nennung	TYPENSCHILD 125 x 148 (ENGLISCH)			PC-E
Werkstoff	METALPHOTO	Masse	0.060 KG	CH E Bezugsart FA
Datum	10.07.13	Gepr	Schaier	Verfilmt
Name	Schaier	T		
Abt.	ZB 537	B	09.11.00	

Allgemeintoleranzen nach DIN ISO 2768-m

8. Site Plan:



- | | | | |
|---|---------------------------------------|---|-------------------------|
|  | safety scanner area zone |  | request open door |
|  | light curtain 3-beam no human safety |  | emergency stop |
|  | vertical light curtain human safety |  | start cycle button |
|  | horizontal light curtain human safety |  | stop automatic button |
|  | safety door Schuler |  | acknowledge safety zone |
|  | safety door customer |  | slide close |
|  | fixed safety with Makrolon |  | slide open |
|  | slide lock indicator |  | move home pos. |
| | |  | acknowledge move axis |

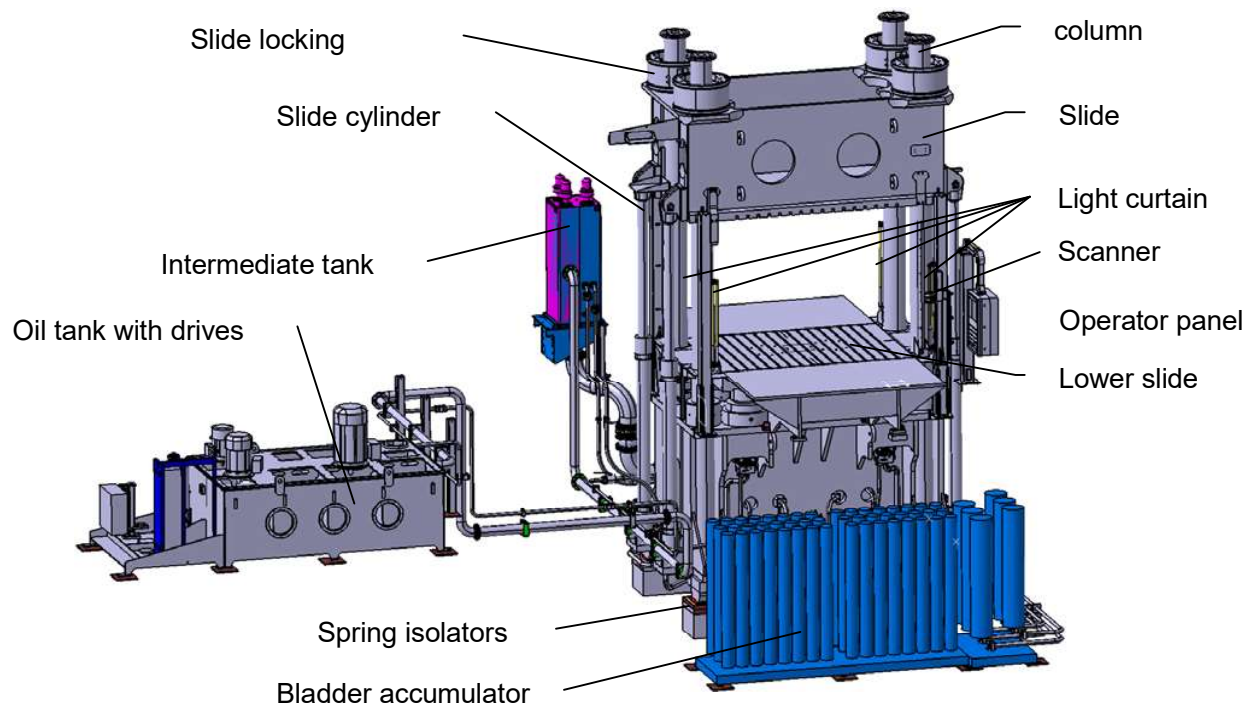
3.0 Design and function

Design and function

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 - Proportional valves
 - Heat exchanger
 - Temperature monitoring
 - Oil filter
 - Filter monitoring
 - Parallelism monitoring of slide and lower slide
 - Stroke adjustment of the slide



3.0 Design and function

3.1 Design of the machine / press line

The machine consists of the following main components:

Press frame

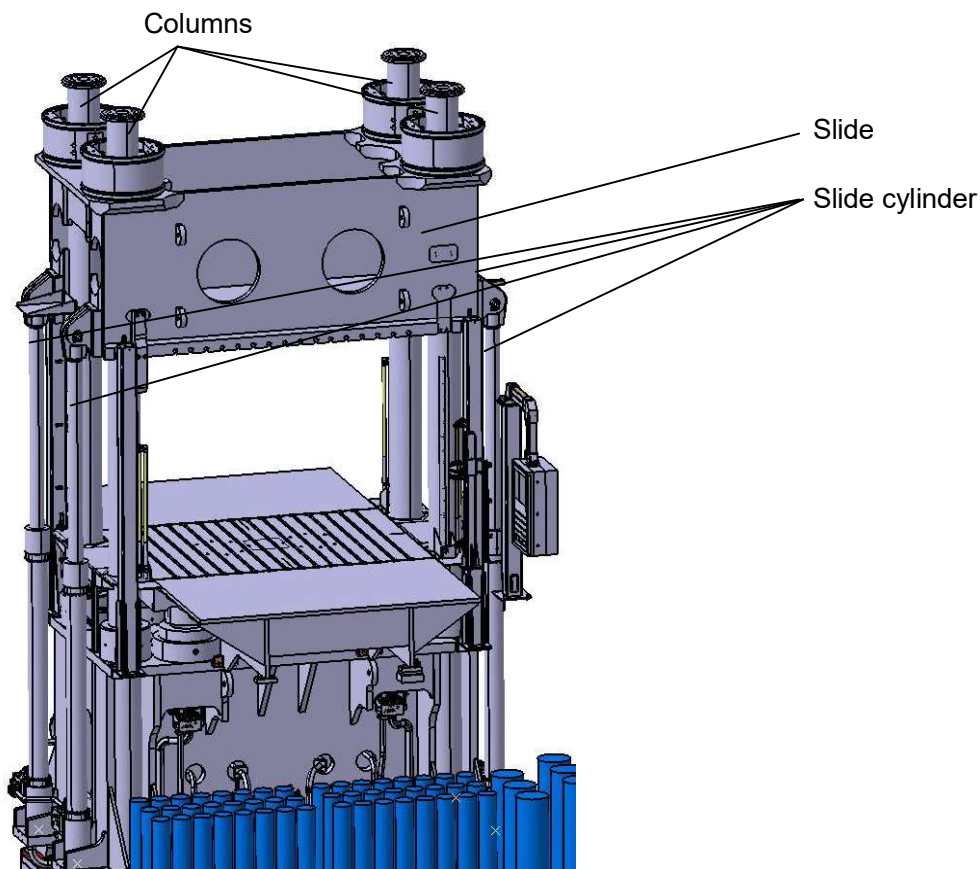
The press frame is made up of the slide, the columns, the lower slide and the table. These parts are connected by hydraulically preloaded tie rods in the table to form a rigid unit. The tie rods are hydraulically preloaded.

Slide

The slide, which is a welded construction, is guided on the columns. The slide is driven by four cylinders attached to the slide and table – refer to fig. 1 "slide cylinders".

The maximum temperature on the slide plate is 160°C. An insulating plate between the slide plate and die must be inserted if temperatures above this level are possible on the die.

PLEASE NOTE!

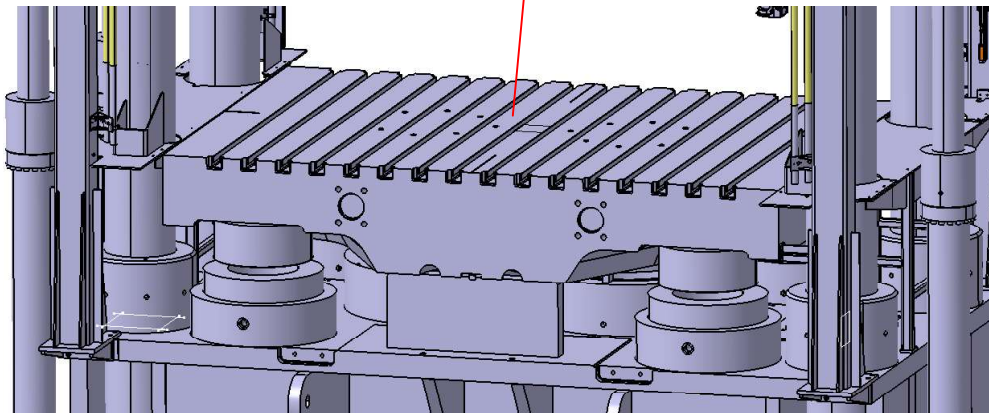


Lower slide

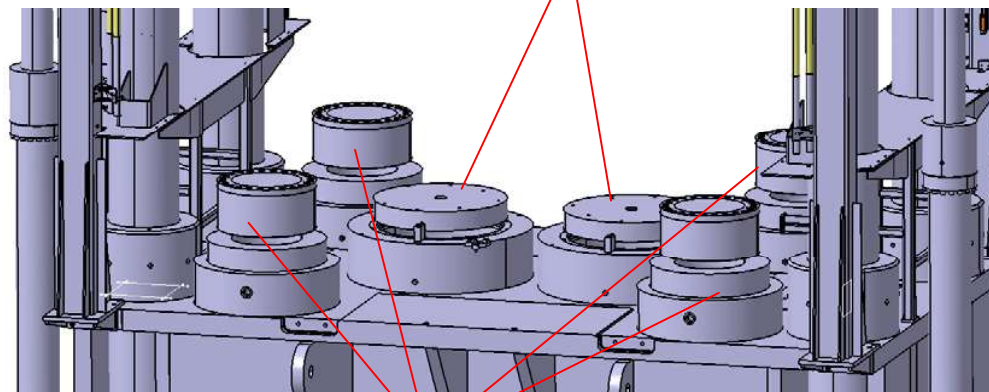
The lower slide consists of a thick steel plate with T-grooves to load the die. The lower slide is driven by two plunger cylinders, refer to fig. 2, and four differential cylinders, refer to fig. 2.1. The plunger cylinders and differential cylinders are fixed in the lower cross-bar.

The central plunger cylinders provide the forming force, the outer differential cylinders provide additional parallel control forces, alongside the forming force, and the opening force to open the die after the forming process.

Lower slide



Plunger cylinder



Differential cylinder

Start-up

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5.0 Start-up

5.1 Instructions in reference to personnel and safety

Operation in compliance with the safety requirements

The machine may only be run by trained operators with a written authorization. The responsibilities for operating the machine must be clearly defined by the user and complied with to prevent misunderstandings in competence matters especially as far as safety aspects are concerned.

This is also particularly important for work on electrical, hydraulic and pneumatic equipment, which should only be executed by specialized personnel. If modifications are to be made the manufacturer must give his consent in writing with reference to the product liability regulations, please also refer to section "Interdiction of arbitrary rebuilding and modifications" in chapter 2.6 Additional dangers".

For all jobs related to assembly, operation, modification, adaptation, maintenance and repairs, the measures for switching off the machine as described in the operation manual must be observed.

Each hazardous energy has to be

- switched off,
- shut off,
- inoperative

to be secured against getting switched on accidentally.

It is the responsibility of the operator to make sure that nobody is present inside the danger area.

This is the responsibility of the operator.

In emergency situations press the EMERGENCY-STOP button.

Safety rules for the operator

- Avoid any operational mode that might be prejudicial to safety.
- Before starting up or setting the machine/plant in motion, make sure that nobody is at risk.
- Before triggering a function it has to be ensured, that nobody is present inside a danger area.
- Pay attention to the warning and information signs on the machine.
- Work in or access to the die area is not allowed unless the slide is locked and the drive is turned off.
Even for quick jobs in the die space the EMERGENCY STOP button must be pressed to prevent the press from unexpected restarting.
- Do not remove or put out of function any protecting devices or coverings from moving parts.
- Do not dismantle enclosures or railings (provided against danger of falling down) or fencings.
- Do not deposit tools or other devices in the die area.
- Ensure free access to the operator panels.
- Check at least once in every shift if the machine shows any visual damage or deficiencies, for example safety guards, on pipes, screw fittings, flexible tubes, electric cables etc. It is recommended to make a check list.
- If irregularities should occur, stop operating the machine and report it to the supervisor.
- If hydraulic fluid or compressed air is leaking/escaping, shut down the machine and report it to the supervisor.
- In case of smoke or unusual noises stop the machine and report it to the supervisor.
- If safety equipments have to be dismantled during repair or maintenance work, put the machine out of operation and lock the mains switch.
- After completion of the repair and maintenance work, reinstall the safety equipments, check their proper function and confirm this in writing before starting production.

5.2 Erection

It stays in the responsibility of the operating company or the architect/contractor to ensure that the foundation is suitable to withstand the forces generated by the equipment. This is based on the information provided by the manufacturer.



Cleaning after unpacking

For transportation all bright parts of the machine are covered with a surface protection agent which must be thoroughly removed afterwards.

Use non-fraying and soft rags for cleaning.

The protection agent can be removed with an appropriate solvent.

Foundation

The suitability of the foundation concerning static and dynamic load is to be verified by the operator. All data necessary for the foundation statics such as dimensions, admissible loads, types of fixing, weights etc. can be taken from the attached **Foundation plan** and the **Transfer sketch**.

To protect the soil and ground water underneath the foundation, the latter must be made of impermeable concrete. Please also refer to the following non-committal information sheet "Press Foundations/Hydraulic Oil". In addition the national regulations of the user country have to be observed.

PLEASE NOTE !

Before setting the machine on the foundation, place the anchor bolts (foundation bolts) with the washers and nuts in the holes provided in the base plate for this purpose.

Erection

The machine is brought to the place of erection either horizontally on a transport frame or dismantled in its components, depending on whether it is a monobloc or tie-rod construction. There are borings or eyes for fixing shackles on the press body resp. on the press components so that the machine can be suspended to the load hooks of the corresponding transport crane. The erection and assembly of the individual components (especially in case of tie-rod constructions) requires great care and diligence, please refer to erection drawing.

Depending on the size and design of the press, the erection can be rigid or vibration-proof.

Modes of fixing in case of rigid erections:

1. Foundation bolts
2. Plug fixing by means of bolts
3. Fixing on a grid by means of bolts

For vibration-proof erection or erection without fixing the following elements are available, e.g.:

1. Phonogum swing rails
2. Effbe-Barrymount elements
3. Gerb spring-type elements and Visco dampers
4. Air-Loc elements etc.

Rigid erection

In case of rigid erection the machine is first levelled exactly by means of a precision spirit level, which is placed on the press bed. Threads in the base plate allow for levelling by levelling bolts which are then locked. Subsequently, the foundation bolts are grouted with concrete. As soon as the concrete has set, the nuts of the foundation bolts must be tightened.

For grouting the concrete ADDIMENT VERGUSSBETON 1 is particularly suitable. It is an easy-to-pour, contraction-compensating, ready-to-use mix available on the market in 50-kg-sacks.

Plug fixing or fixing of the press on a grid is made after levelling by means of hexagon bolts or hexagon sockets.

Vibration-proof erection

In case of a vibration-proof erection the foundation floor must be even and levelled horizontally (i.e. not more than 1 mm/m of tolerance). The machine may also be erected on precisely levelled steel plates or levelling plates which are embedded in the concrete or placed below the machine.

Please observe the relevant instructions and regulations of the manufacturers for vibration-proof elements.

Press foundation / Hydraulic oil

The national regulations of the user country have to be observed.

Mineral oils are generally known as non-corrosive to concrete, i.e. as long as mineral oils and greases are free of acids they do not damage concrete.

To protect the soil and ground water below the foundations, foundations which come in contact with oils and greases must be made of impermeable concrete. The concrete must have a water-cement ratio of ≤ 0.5 . The initial consistency of the concrete should be plasticized or almost stiff. To achieve a consistency for easy handling suitable solvents or concrete plasticizers are to be used. The max. grain should be limited to 32 mm. The concrete must be mixed and handled as B II concrete according to DIN 1045. The reinforcement rate is to be improved in order to limit possible cracks and crevices to a width of max. 0.15 to 0.10 mm. The limits for cracks and crevices can be determined by calculation.

The foundation should have a sufficient rim to be able to take even larger quantities of oils and greases. The collected oils must not stay in this collect basin over a longer period (i.e. several days) but must be drained or extracted as soon as possible. Should the concrete be continuously exposed to oil, it must be provided with a permanent protection layer. Suitable protective agents are impermeable synthetic paints and plastic coatings.

5.3 Assembly- and start-up instructions

This machine is an incomplete machine.

The following parts are needed for a complete machine:

- automatic material feed,
- part removal,
- part handling,
- waste disposal,
- as well as the respective protective equipment.

The assembly and start-up of the press are associated with test procedures and safety certifications. Assembly and start-up are only to be conducted by employees of SCHULER PRESSEN GmbH & Co. KG or other personnel authorized by either company!

Non-compliance against this stipulation leads to a forfeiture of any warranty- and liability claims!
SCHULER PRESSEN does not assume liability for any damages due to incorrect implementation.

Before start up by the operating company the country-specific regulation and the related inspections have to be observed.



Electric power supply

The entire electrical equipment is completely wired within the machine up to the terminal box. For the main electric power supply there is an opening in the electrical cabinet. Here the main supply line enters the cabinet and is connected with the corresponding terminals of the mains switch.

The supply connection must be made by expert personnel according to the prevailing regulations of the power supply company in charge



There are further openings for the connecting cable between machine and electrical cabinet.

Cooling water supply

The minimum pressure difference between water inlet and outlet must be 3 bar. The cooling water inlets and outlets can be taken from the hydraulic diagram in chapter 14 "Technical documents hydraulic/pneumatic". The drawing also shows the max. water flow rate and the max. water inlet temperature.

When using cooling media, which could be contaminated, for example like surface water, cooling circuit water (open circuit), heating water (especially with older machines) pre-filters have to be installed.

Please note!

Water quality

The above mentioned values are estimates only that may vary under different operating conditions. Any warranty claims that may arise therefrom shall be denied.

Please also refer to the information in the documents regarding heat exchangers in chapter 18.

pH-value	6-9	
Chloride	<900	mg/l
Sulphate	<50	mg/l
Ammonia	<1,5	mg/l
Manganese	<1	mg/l
Nitrate	<100	mg/l
Iron	<2	mg/l
Free carbonic acid	<20	mg/l
Free chloride	<5	mg/l
Conductivity	<10	µS/cm

Compressed air supply (if applicable)

The required operating pressure for compressed air can be taken from the hydraulic or pneumatic diagram. Location and dimensions of the connection are shown on the approval drawing. Please refer to the chapter 14 "Technical documents".

Selection of the appropriate hydraulic oil

The selection of the best suitable lubricants is essential for the trouble-free operation of the machine. Using unsuitable lubricants impairs the function and the service life of the machine. In addition the warranty entitlement is at risk.

The hydraulic system of the machine is designed for the use of hydraulic fluids based on mineral oil (hydraulic oil). **Aqueous and synthetic fluids are not suitable.**

It is imperative to use **hydraulic oil HLP as per DIN 51 524, part 2**, issue April 2006 and the Schuler Pressen additional specification, please refer to chapter 7.4 "Running and process materials", in the viscosity category **ISO VG 46** according to DIN 51 519.

This hydraulic oil can be used for machines which are operated in rooms with a temperature range from +15° C and +40° C.

If the ambient temperature temporarily falls considerably below +15° C, a thermostatic oil heating must keep the oil at operating temperature. If a machine runs under conditions which keep the oil temperature extremely low (e.g. low number of cycles, low output requirements while the ambient temperature is constantly below +15° C), it is preferable to use hydraulic oil with the viscosity quality ISO VG 32. This requires the approval of Schuler Pressen.

The attached "**Lubricants chart**" in chapter 7.4 "Running and process materials" shows a number of proven oil process brands.

PLEASE NOTE !

Any defects or damages caused by the use of hydraulic oils not listed in our lubricant table or which do not correspond to the additional specification are to be assumed by the operator.

Ask your oil supplier to provide the relevant safety data sheets for the hydraulic oil used as prescribed by the applicable safety regulations.

Pay particular attention to the instructions described in these data sheets on "Storage and handling" and "Safety measures in case of accidents and fire".

Lubricants must not seep down into the ground or be evacuated through the ordinary sewerage system.

Waste oil must be disposed of in accordance with the prevailing legislation.

Mixing and compatibility of different hydraulic oils

The lubricant characteristics of hydraulic oil are determined by various additives that are matched to each other. The various additive packages are sometimes not compatible with each other.

Should hydraulic oils of various manufacturers or various types manufactured by the same company be mixed with each other, then chemical reactions can occur which lead to bonding, aging of the oil, filter blockings, sediments and a deterioration of the air release property, etc. This may lead to malfunctions and damages of the hydraulic system. For this reason it is not admissible to mix different oils. In addition our warranty does not cover the use of mixed oils.

HLPD - Oils

HLPD – oils are oils with detergent/dispersing characteristics. This oil has a higher dirt removal capability and also has a higher cleaning efficiency.

The air release quality can be impaired during operation by oil aging and dirt absorption. The service life of the HLPD – oil is significantly less than the service life of the HLP – oil.

When switching from HLP – oil to HLPD – oil increased appearance of dirt due to the detachment of "old impurities" can result. This also leads to a reduced filter service life.

Filling of oil

Since even newly supplied hydraulic oil may be contaminated considerably by dirt particles which are not detectable visibly, the oil filling must be performed by means of a pump unit, equipped with a 10 μ filter.

The filler neck is provided with a label indicating the required quality and quantity of the oil.

To start the filling process the slide and slide ejector (if provided) must have been moved to TDC, the bed cushion (if provided) must be in BDC position and the control has to be turned on.

ATTENTION !

Please adhere to this procedure also when refilling oil, as otherwise over-filling of the oil tank might occur.

The oil container has been filled up, as soon as the respective message has appeared on the screen.

Afterwards idle strokes are to be executed with max. stroke settings, to fill the overhead tank as well as all lines and consumers with oil. The filling of the overhead tank, the pipes and cylinder spaces causes the oil level in the container to drop. The oil level has to be raised to its pre-defined height until the respective message appears on the screen again.

Stop the filling process and close the filling port via a filler cap.

Please make sure that always oil of the same quality and of the same supplier is used when refilling. Further notes also refer to "Mixing and compatibility of different hydraulic oils".

Purity category

The filtration equipment of the machine is designed to ensure that the hydraulic oil meets and maintains the purity level 17/15/12 or even better as per ISO 4406 (1999).

The service life of the filter elements depends largely on the existing operating conditions (shifts per day, contamination and type of filter element). When starting-up a new machine or when filling the oil without prior filtration, it may happen that 2 or 3 filter elements have to be replaced within a very short period in order to reach the required purity category of the system.

Please note!

When replacing filter elements, refer to chapter 7.2 "Maintenance work", section "Filter", please exclusively use original products.

In case of significantly high contamination (extremely dusty air, metal wear due to friction on piston rod seals) additional filtration via an external filter unit.

Should the filter element service life remain extremely short after the first cleaning phase, then the chemical composition of the hydraulic oil has to be checked and the filter manufacturer should perform a filterability test of the oil.

Should the line be operated with oil that does not meet the required degree of purity, the warranty for the hydraulic components, which failed due to insufficient oil purity, expires.

Selection of the appropriate hydraulic oil

The selection of the best suitable lubricants is essential for the trouble-free operation of the machine. Using unsuitable lubricants impairs the function and the service life of the machine. In addition the warranty entitlement is at risk.

The hydraulic system of the machine is designed for the use of hydraulic fluids based on mineral oil (hydraulic oil). **Aqueous and synthetic fluids are not suitable.**

It is imperative to use **hydraulic oil HLP as per DIN 51 524, part 2**, issue April 2006 and the Schuler SMG additional specification in the viscosity category **ISO VG 46** according to DIN 51 519.

This hydraulic oil can be used for machines which are operated in rooms with a temperature range from +15° C and +40° C.

If the ambient temperature temporarily falls considerably below +15° C, a thermostatic oil heating must keep the oil at operating temperature. If a machine runs under conditions which keep the oil temperature extremely low (e.g. low number of cycles, low output requirements while the ambient temperature is constantly below +15° C), it is preferable to use hydraulic oil with the viscosity quality ISO VG 32. This requires the approval of Schuler SMG.

The **following lubricant table** provides information about the approved oils.

PLEASE NOTE !

Any defects or damages caused by the use of hydraulic oils not listed in our lubricant table or which do not correspond to the SMG additional specification are to be assumed by the operator.

The lubricant characteristics of hydraulic oil are determined by the additives which are harmonized with each other. The different additive packages are sometimes not compatible with each other. Therefore it is not admissible to mix different oils.

Ask your oil supplier to provide the relevant safety data sheets for the hydraulic oil used as prescribed by the applicable safety regulations.
Pay particular attention to the instructions described in these data sheets on "Storage and handling" and "Safety measures in case of accidents and fire".

Lubricants must not seep down into the ground or be evacuated through the ordinary sewerage system.
Waste oil must be disposed of in accordance with the prevailing legislation.

Lubricant table

Hydraulic oil HLP 46 according to DIN 51 524-2 issue 4/2006
Viscosity class ISO VG 46

Not containing zinc

Manufacturer	Designation	
Agip	OSO S 46	
	Precis BR Fluid -46	
Aral	Vitam 4243	HLPD
	Vitam MW 46	
Avia	Avilub Hydraulic HMW 46	
	Avilub Hydraulic DD 46	
BP	Energol HLP-DH 46	HLPD
	Energol HLP-S 46	
Blaser	Hydraulic a. industrial oil 46 - Art.No. 158-01	
Castrol	Hyspin DSP 46	HLPD
Chevron	Texaco Randon EP Ashless 46	
Fuchs	Renolin ZAF 46 DT	HLPD
	Renolin ZAF 46 D	HLPD
	Renolin MWB 46	HLPD
Klüber	Lamora HLP 46	
Mobil	Hydraulikc Oil M 46	
Petrover	Isolubric VG 46	
	Isolubric VG 46 D	HLPD
Shell	Tellus DO 46	HLPD
Total	Azolla DZF 46	HLPD
ZG	Divinol HLP 46 MWB	

Containing zinc

Manufacturer	Designation
Agip	OSO 46
	Precis HLP 46
Aral	Vitam GX 46
BP	Energol HLP-D 46 HLPD
Blaser	Hydraulic oil 46 - Art.Nr. 27514
Castrol	Hyspin AWS 46
Esso	Nuto H 46
Fuchs	Renolin MR 15 HLPD
	Renolin B 15
Mobil	DTE 25
	Hydraulic oil HLPD 46 HLPD
Shell	Tellus 46
Total	Azolla ZS 46
ZG	Divinol DHGISO 46 HLPD

Schuler-SMG Additional Specification

For hydraulic oil according to DIN 51524-2, issue April 2006

	Oils not containing zinc	Oils containing zinc	Compare DIN 51524/2 Issue April 2006	Remarks
ARP (Air release property)	≤ 8 min	≤ 8 min	10 min	
Behaviour in mixed friction area according to Brugger, DIN 51347	≥ 30	≥ 20	Not determined	
Degree of copper corrosion	max. 1		max. 2	Influences the aging of the oil, filter change intervals and wear and tear of components
Water content of fresh oil	< 300 ppm	< 300 ppm	500 ppm	Limit value of used oil: A water content increased by 500 ppm leads to cavitations and therefore to wear and tear of components. A water content of 1000 - 1500ppm for the duration of 2-3 days is not critical.
Mechanical check FZG-testing machine DIN 51354/2 or DIN ISO 14635/1 scuffing load step	≥ 11	≥ 11	min.10	
Neutralisation value (for fresh oil)	max. 0,5 mgKOH/g	max. 0,5 mgKOH/g	Not determined	Rise of the neutralisation count of used oil in comparison to fresh oil: maximum 0,4. In general values of > 1 are critical. Influence on cavitation risk.
Zinc content	< 10 ppm		Not determined	

Direction of rotation

The rotation of the pumps must be in accordance with the direction in which the arrow sign on the motor housing or mounting cover is pointing. This can be checked by watching the movement of the pump vanes through the ventilation slits in the motor housing. If the motors, and consequently the pumps, show the wrong direction of rotation, this can be remedied by exchanging two of the phases on the power supply unit. If the pumps run with the wrong direction of rotation for some time, serious pump defects and even a total breakdown may be the consequence.



Lubrication

Before start of machine operation all machine parts have to be lubricated according to the lubrication instructions.

Check of screw fittings

All screw fittings of pipes, valves, cylinders etc. must be checked and retightened, if necessary.

To accomplish this, the operating instructions of the torque wrench or the servo screwdriver have to be observed.

ATTENTION !

Refilling of hydraulic oil

The slide has to make several idle strokes over the max. stroke length in order to fill the pipes and end consumers of the hydraulic system with oil. Since the pipes and cylinder chambers are then filled with oil, the oil level in the tank falls as a logic consequence. For this reason the oil quantity in the tank has to be brought to the prescribed level by adding further oil.

Pressure accumulators

The machine is equipped with accumulators which need to be inspected and accepted. The accumulators have to be notified to the responsible technical inspection authorities prior to their first start-up at the erection site (e.g. TÜV, SDI, ANCC, ASME etc.). The procedure includes submission of the acceptance certificates which are attached in chapter "Technical documentation".

Re-charging of pressure accumulators

The pressure accumulators need to be re-charged with nitrogen before they are put to the first test run.

Between compressed oil and nitrogen there is an oil-resistant rubber bladder or a free moving piston, depending on the accumulator type, which serve as separating medium. If necessary, separate gas cylinders are used to provide the required nitrogen quantity.

On the hydraulic diagram, refer to chapter "Technical documentation", the nitrogen charging pressure as required in each case is indicated for the accumulators being empty. The charging device required for charging the accumulators with nitrogen is included in the scope of supply for the machine. The nitrogen has to be provided by the customer.

Please take note of the documents and other information of the company Hydac included in chapter 18 "Technical documentation supplier part".

The operator has to provide sufficient amounts of ventilation systems and oxygen monitoring devices because nitrogens accumulators are used.

Please note!

Charging procedure bladder accumulator

Please also refer to technical documentation of the special charging and testing device from company Hydac in chapter 18 "Technical documentation supplier parts"

1. Connect the charging device to the adapter of the accumulator after having removed the end cap and the valve cap. Subsequently, open the gas valve by screwing-in the spindle.
2. Open the shut-off valve at the nitrogen cylinder very slowly, and charge accumulator up to the charging pressure level indicated in the hydraulic diagram (Ppre-load).
3. The charging pressure can be monitored by means of the charging device manometer. Excessive pressure is reduced by slowly opening the second valve screw located at the charging device.
4. Once the nitrogen pressure has been generated, close the valve of the nitrogen cylinder and wait for a short time. Check pressure once again after 10 minutes and recharge, if necessary.
5. Once the desired pre-charging pressure has been generated, the spindle must be unscrewed, so that the gas valve on the accumulator closes. Check the latter as to tightness by using spray or soap water.
6. Screw cap nut H and protective cap S over the gas valve and tighten. The cap nut H with inserted O-ring assumes the actual sealing function. Subsequently, the protective cap S must be screwed on again.
7. When the pumps are turned on, the hydraulic accumulators are automatically charged with oil.

Once all these operations have been completed, the machine is ready for operation.

Checking of the nitrogen pressure

After start-up of the machine, the charging pressure should be checked at least once during the first week to make sure that considerable nitrogen losses are detected and eliminated immediately. In the course of the next 2 months, the nitrogen pressure should be checked every 3 weeks and later every 3 months.

The filling pressure in the bladder accumulators can be read via the respective pressure gauges, please also refer to hydraulic drawings in chapter 14 "Technical Manuals Hydraulic/Pneumatic".

In addition you can gauge the nitrogen pressure separately on each bladder accumulator using the special charging and testing device.

Proceed as follows:

1. Switch off the machine drive.
2. On the oil side, the accumulators are automatically dumped. If there is no automatic dumping of the accumulators, the drain valve must be opened to allow a very slow dumping for reasons of temperature equalizing.
3. Observe gauges constantly during the dumping process. They indicate a slow and steady pressure decrease. There is a sudden drop of pressure on the oil side when the accumulators are totally empty.
The pressure which is indicated before the sudden pressure drop corresponds to the nitrogen charging pressure ($P_{\text{pre-load}}$).
4. If the charging pressure ($P_{\text{pre-load}}$) is not correct, the accumulators have to be recharged as described under "Charging process".

**Only use nitrogen for charging the accumulator, never use oxygen!
Danger of explosion !**



The filling process has to be monitored.

Nitrogen is asphyxiating at high concentrations. Contact your supplier regarding the corresponding safety data sheets. The noted dangers, measures as well as storage and handling procedures have to be paid attention to.

NOTE !

The charging and checking device will be supplied in the German standard thread.

Charging hose with sleeve nut G 1 for connection with the nitrogen bottle valve.

If the thread of the nitrogen bottle is different, an adapter is required to connect it to the accumulator, please also refer to technical documentation of the special charging and testing device in chapter 18 "Technical documentation supplier parts". This adapter has to be provided by the customer.

16.1 Drawings

Erection plan

Die space

Foundation drawing

