CE

USE AND MAINTENANCE MANUAL

ORIGINAL
EN

TB 50

IS17/10 - 561407

Serial number | Year

						/		

TURBOSOL
TECNOLOGIA DI POMPAGGIO PER L'EDILIZIA

INDEX

1 - GENERAL INFORMATION

Dear Customer

Congratulations on your purchase of a TURBOSOL machine. Our long experience, attention to the needs of users and the continuous technological research allow us to offer high quality machines, reliable and long-lasting.

Even if you have used this type of machine before, it is extremely important to be informed on the operation and features by the TURBOSOL PRODUZIONE S.p.A. authorised technicians or by your Dealer, once delivered.
By following these guidelines, you will know how to get the best performances from this machine.

For any information, please contact the TURBOSOL PRODUZIONE S.P.A. Assistance Service.

Turbosol Produzione S.p.A.
Via Alessandro Volta, 1
31030 Pero di Breda di Piave (TV) - ITALIA

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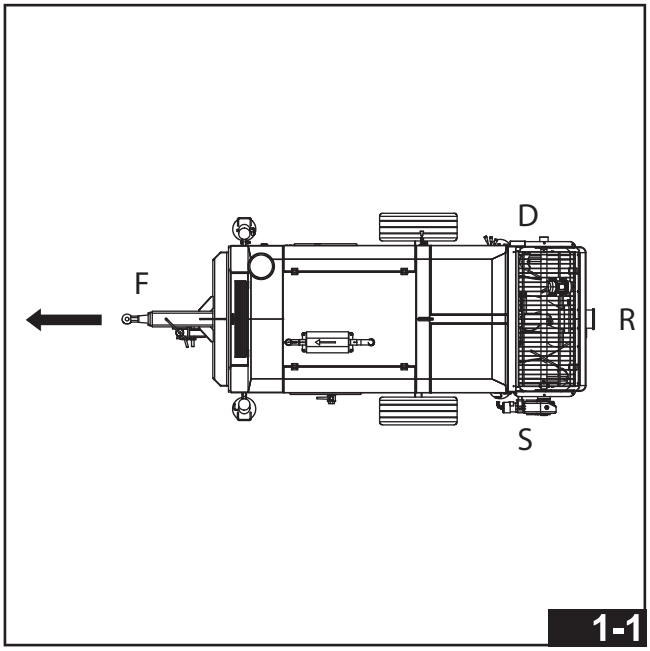
You can also contact your Dealer or local Assistance Service.

1.1 MACHINE IDENTIFICATION

1.1.1 Machine orientation

Front F, rear R, left side S and right side D refer to the running direction of the machine.

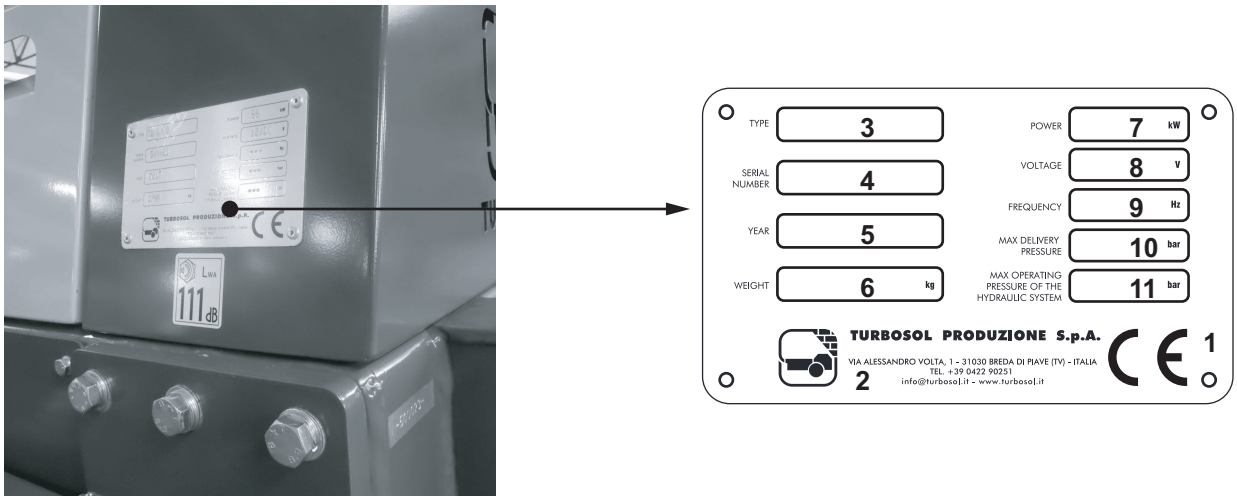


1-1

1.1.2 Machine plate

The machine plate is affixed on the front of the left side. It bears the following information:

1 CE Marking
2 Manufacturer's company name and address
3 Type
4 Serial no.
5 Year of manufacture
6 Weight
7 Installed power
8 Power voltage
9 Frequency
10 Maximum pumping pressure
11 Maximum hydraulic system pressure



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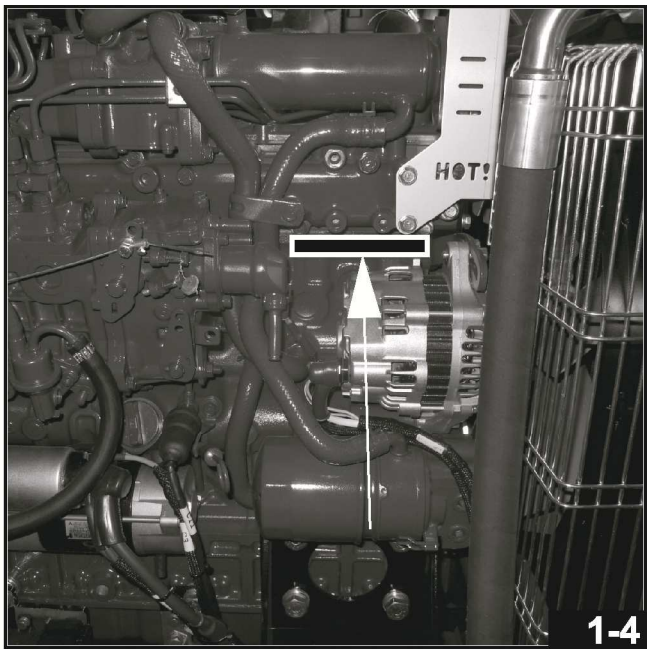
1.1.3 Machine and engine serial number

In addition to being indicated on the factory plate, the machine serial number is stamped on the chassis (Fig. 1-3).
The motor's serials number is imprinted on the base of the motor (Pic. 1-4).

1-3



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1.2 DOCUMENTATION ACCOMPANYING THE MACHINE

The machine is delivered with the following documentation:
- Use and Maintenance Manual
- EC Declaration of Conformity
- S.P.C.
- Warranty certificate
- Engine Use and Maintenance Manual
- Trailer booklet
- System diagrams

1.3 EC DECLARATION OF CONFORMITY (FACSIMILE)

TURBOSOL

DICHIARAZIONE CE DI CONFORMITÀ / *EC DECLARATION OF CONFORMITY*

2006/42/CE (Allegato II, parte A), 2000/14/CE (Allegato II) / *2006/42/EC (Annex II, part A), 2000/14/EC (Annex II)*

Fabbricante / *Manufacturer*	**TURBOSOL PRODUZIONE S.p.A.**
Indirizzo / *Address*	Via Alessandro Volta,1 – 31030 Pero di Breda (TV) Italia

Nome e indirizzo della persona autorizzata a costituire il fascicolo tecnico / *Name and address of person authorized to compile the technical file*

Nome / *Name*	**TURBOSOL PRODUZIONE S.p.A.**
Indirizzo / *Address*	Via Alessandro Volta,1 – 31030 Pero di Breda (TV) Italia

Il fabbricante dichiara che la macchina / *Manufacturer declares that the machinery*

Tipo / *Type*	Pompa da calcestruzzo *Stationary concrete pump*
Modello / *Model*	**TB 50**
Matricola / *Serial N°*	**XXXXXX**
Potenza installata / *Installed power*	**55 kW**
Anno di costruzione / Year of manufacture	**2017**

risulta in conformità a tutte le disposizioni pertinenti previste della seguenti direttive comunitarie (comprese le modifiche applicabili) / *conforms to all the provisions set out by the following EU directives (including applicable amendments)*

2006/42/CE – Direttiva Macchine
2006/42/EC – Machine Directive

2014/30/UE – Direttiva Compatibilità Elettromagnetica
2014/30/UE – EMC Directive

2000/14/CE - Emissione acustica ambientale delle macchine destinate a funzionare all'aperto
2000/14/CE - Noise emission in the environment by equipment for use outdoors

Livello potenza sonora garantita / *Guaranteed sound power level*	**111 dB(A)**
Livello potenza sonora misurata / *Measured sound power level*	**109 dB(A)**

Ai sensi della Direttiva Macchine è stata applicata la seguente norma / *In accordance to the Machine Directive the following standard was applied*

EN 12001:2012 - Conveying, spraying and placing machine for concrete and mortar. Safety requirements

Ai sensi della Direttiva Compatibilità Elettromagnetica è stata applicata la seguente norma / *In accordance to the Electromagnetic Compatibility Directive the following standard was applied*

EN 13309:2010 - Construction machinery - Electromagnetic compatibility of machines with internal power supply

CTO

SCOMPARIN TARCISIO

Pero di Breda di Piave,
21.06.2017

1.4 WARRANTY LIMITS

Turbosol Produzione S.p.A. machines are covered by a warranty for a 12 (twelve) month period or 1000 hours of work - whichever occurs first - starting from the delivery date of the machine to the Final user and, however, not beyond 18 (eighteen) months from their shipment date. The machine's delivery date to the End user must be reported on the warranty certificate that must accompany all newly manufactured machines. The warranty shall only be valid if the manufacturing company receives the warranty certificate card, duly completed and signed by the purchaser, within 30 days from the machine delivery date. The warranty covers any manufacturing or material defects. The goods supplied by Turbosol Produzione S.p.A. but manufactured by third parties are covered by the warranty granted by the latter to Turbosol and that is applied to the Final user. Only the Manufacturing Company and the Organisations expressly authorised by it may intervene in the event of faults during the warranty period. The faulty pieces must be sent to the Manufacturing Company ex works, which commits to gratuitously repair or replace those parts that, at its indisputable judgement, show quality defects. The faulty pieces must be sent to the Manufacturing Company ex works, which undertakes to gratuitously repair or replace those parts that, at its indisputable judgement, show quality defects. The replaced parts remain the manufacturer's property. The purchaser is responsible for the material shipment expenses and those relating to servicing by the Manufacturing Company's personnel, if required. The repair or replacement supply will not extend or renew the overall warranty period. Parts subject to normal wear or inducible deterioration are excluded from the warranty, such as: valves seats and rubber ball valves, pistons and jackets, rubber stators and screws, bushes, flaps, mixing blades, tanks protection armour, wear cones and plates, filters, etc. The purchaser loses the right to the warranty if the payment conditions are not respected, even only once, should the declared faults be caused: by the actions of the Purchaser, its employees or third parties, when the defect depends on bad use, incorrect installation, improper use or use that is not compliant with the instructions in the use and maintenance manuals received with the machine. The warranty becomes void if the injection systems are damaged by unsuitable or polluted fuel, in the event of faulty electrical systems due to unsuitable power supply or components like relays, condensers, remote switches, remote controls, etc.: only the supplier warranty applies to these. The warranty also becomes void due to arbitrary tampering, use of non-original spare parts or rubber hoses different to those supplied by the Manufacturing Company. The Manufacturing Company is not responsible for any damage caused by the impossibility of using the product or damage due to work interruption or, direct or indirect, profit losses for damages also caused by the removal of casings or protection carters from the moving parts and safety mechanisms. Flaws and defects must be reported in writing to the manufacturer within the legal terms. Refer to the original text in Italian in the event of disputed interpretation of the above clauses.

1.5 SPARE PARTS AND DUPLICATES OF DOCUMENTS

The request for spare parts must be submitted to the Dealer or directly to TURBOSOL PRODUZIONE S.p.A., always indicating:
- the identification date of the machine shown on the factory plate: type of machine, serial number, year of manufacture;
- component code and description, found on the S.P.C.;
- the required quantity.

When requesting spare parts of components not manufactured by TURBOSOL PRODUZIONE S.P.A., provide the data on the relative rating plates.

Repairs, maintenance and replacements of components not compliant with that indicated in this Manual and/or performed by untrained/unauthorised personnel exclude the owner from any warranty claim and relieve the Manufacturer from all liability for malfunctioning of the machine and any resulting consequences.

The request for duplicates of the documentation accompanying the machine must be submitted to TURBOSOL PRODUZIONE S.p.A., always indicating:
- the identification date of the machine shown on the factory plate: type of machine, serial number, year of manufacture;
- reason of the request.

1.6 INFORMATION FOR CONSULTATION

This paragraph contains information useful for the understanding of the text in this Manual.

1.6.1 Unit of measurement

The I.S. (Internal System) has been adopted for the units of measurement.

SIZE	UNIT	DEFINITION	ALTERNATIVE UNIT OF MEASUREMENT
Time	s	second	min (minute, 1 min = 60 s), h (hour, 1 h=3600 s)
Length	m	metre	mm (millimetre, 1 mm=0,001 m)
Temperature	°C	celsius degree	°F (Fahrenheit degree, °F =°C×1.8+32)
Volume	m^3	cubic metre	l (litre, 1 l=0,001 m^3); gal (gallon; 1 l = 0,21997 gal)
Power	kW	kilowatt	Hp (horsepower, 1 kW = 1,341022 Hp)
Electric voltage	V	volt	-
Electric current	A	ampere	-
Frequency	Hz	hertz	-
Pressure	bar	-	MPa (1 MPa = 10 bar); PSI (1 bar = 14,50377 PSI)
Flow rate	m^3/h	-	l/min (1 l/min = 0,06 m^3/h)
Sound emission	dB	decibel	-

Tab. 1-1

1.6.2 References

The figures are sequentially numbered by chapter. The indication is placed bottom-right of the box; e.g. 2-1 indicates that it is the figure 1 of chapter 2. The figures follow the relative description. In this case, if there are no interpretative doubts, it is omitted in the text preceding the reference to the figure. Where reference is made to the figure of another part of the Manual, the reference is complete, for example, Fig. 2-1.4 indicates part 4 of figure 1 of chapter 2.

The tables are sequentially numbered by chapter. The indication is placed under the table; e.g. Tab. 4-9 indicates table 9 of the fourth chapter.

1.6.3 Apexes

^{2}	square
^{3}	cube
$^{-1}$	reciprocal

1.6.4 Abbreviations and acronyms

S.P.C.	**S**pare **P**art **C**atalogue	min.	minimum
~,approx.	approximately	U.M.M.	**U**se and **M**aintenance **M**anual
chap.	chapter	no.	number
P.P.E.	**P**ersonal **P**rotective **E**quipment	p.	page
rh	right	R.R.	**R**esidual **R**isk
e.g.	example	§	paragraph
etc.	etcetera	lh	left
fig.	figure	s/n	serial number
max.	maximum	tab.	table

1.6.5 Symbols


Conformity marking according to law.


By observing these safety precautions, the operator prevents possible damage caused by the presence of dangerous situations.


It indicates behavioural rules to avoid the generation of dangerous situations.


It indicates particular information/instructions for machine use.


It indicates the operator activity.


It indicates the maintenance the activity.


Correct.


Incorrect.

2 - MACHINE PRESENTATION

2.1 TECHNICAL DATA

ENGINE			
KUBOTA V3307 DI T E3B	Power	kW	55
	MAX/min speed	min^{-1}	2400/1000
	Cooling	Liquid	
	Approval	97/68/CE Stage III A	

ENGINE (OPTIONAL)			
	Power	kW	
	MAX/min speed	min^{-1}	
	Cooling		
	Approval		

ELECTRICAL SYSTEM		
Power voltage	Vdc	12
Fuse flow rate (on positive pole)	A	50
Battery	12V 100Ah 830ccA	

HYDRAULIC SYSTEM		
Pressure relief valve calibration (hydraulic pumping block)	bar	330÷340
Pressure relief valve calibration (S valve exchange / battery charge hyd. block)	bar	200÷210
Pressure relief valve calibration (Agitator / water pump / hopper discharge)	bar	185÷190
Pressure reducer valve calibration (S valve exchange / battery charge hyd. block)	bar	40
Maximum pump displacement regulator pressure	bar	30÷35
Battery pre-charge pressure	bar	140

MACHINE PERFORMANCE		
Maximum pumping pressure	bar	80
Maximum flow rate	m^3/h	50
Maximum number of cycles per minute	no.	27
Maximum pumping granulometry	mm	35
Outfeed manifold	mm	150
Pumping cylinders (diameter/stroke)	mm	200 / 1000
Maximum serviced distance[1]	m	200
Maximum serviced height[1]	m	100
Pipe connection for machine transportation	Type	Victaulic

1 Maximum pumping distance and serviced height depend on the type of concrete and cannot be achieved simultaneously.

HIGH WASHER PRESSURE (Optional)		
Maximum pressure	bar	20
Rated flow rate	l/min	40
Maximum water temperature	°C	60
Minimum water temperature	°C	5

DIMENSIONS AND WEIGHTS			
Hopper	Rated capacity	l	500
	Loading height	mm	1280
Length		mm	4540
Width		mm	2100
Height		mm	2050
Unladen weight		kg	3750

OVERHEAD NOISE EMISSIONS[1] (in compliance with 2006/42/EC and UNI EN 12001:2012, Annex C)		
L_W Sound power level	dB	
L_{WA} A-weighted sound power level	dB	

SERVICE CONDITIONS			
Work environment		-	Construction site, outdoor
Supporting ground conditions		-	Horizontal
Load-bearing capacity of the supporting ground		kN/m^2	>300[1]
Gradient allowed during operation	Longitudinal	Degrees	±5
	Transversal	Degrees	±5
Room temperature	Operational conditions	°C	5<T<40
	Transport and storage	°C	-15<T<55[2]
Minimum lighting required for operation		lux	500
Maximum altitude a.s.l. without sensitive loss of performance		m	1000

1 For soil with less compactness a support plate is required under the outrigger base, suitably sized for the weight of the machine under working conditions and compactness of the soil.
2 For periods of less than 24 h, it is possible to have temperatures of up to +70°C.

FUEL AND LUBRICANTS			
Fuel	Type[1]	Lower or very low sulphur content diesel oil	
	Tank capacity	l	~130
Water	Tank capacity	l	~210
Engine oil	Type	SUPER TURBO SAE 15W40	
	Quantity	l	~8.5
Reducer oil	Type	SAE 90 EP	
	Quantity	l	~2.3
Hydraulic oil	Type	LUBRA OLEODIN 46	
	System total	l	~260
Grease for general use		NLGI Grado 2	
Recommended lubricant oil		TOTAL CIRKAN C 100	

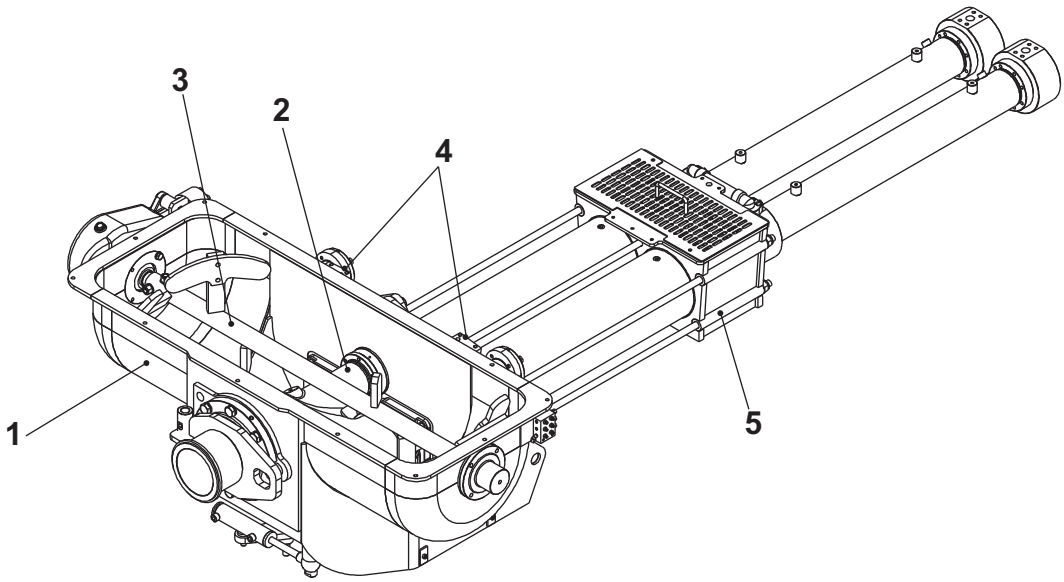
1 Fuels with a high sulphur content may be used following the instructions given in the Engine manual.

2.2 TYPE OF MACHINE

The TB50 is a stationary machine for the distribution and projection of concretes and mortar. It is used autonomously and independently and is only intended for professional operators.

2.3 OPERATION

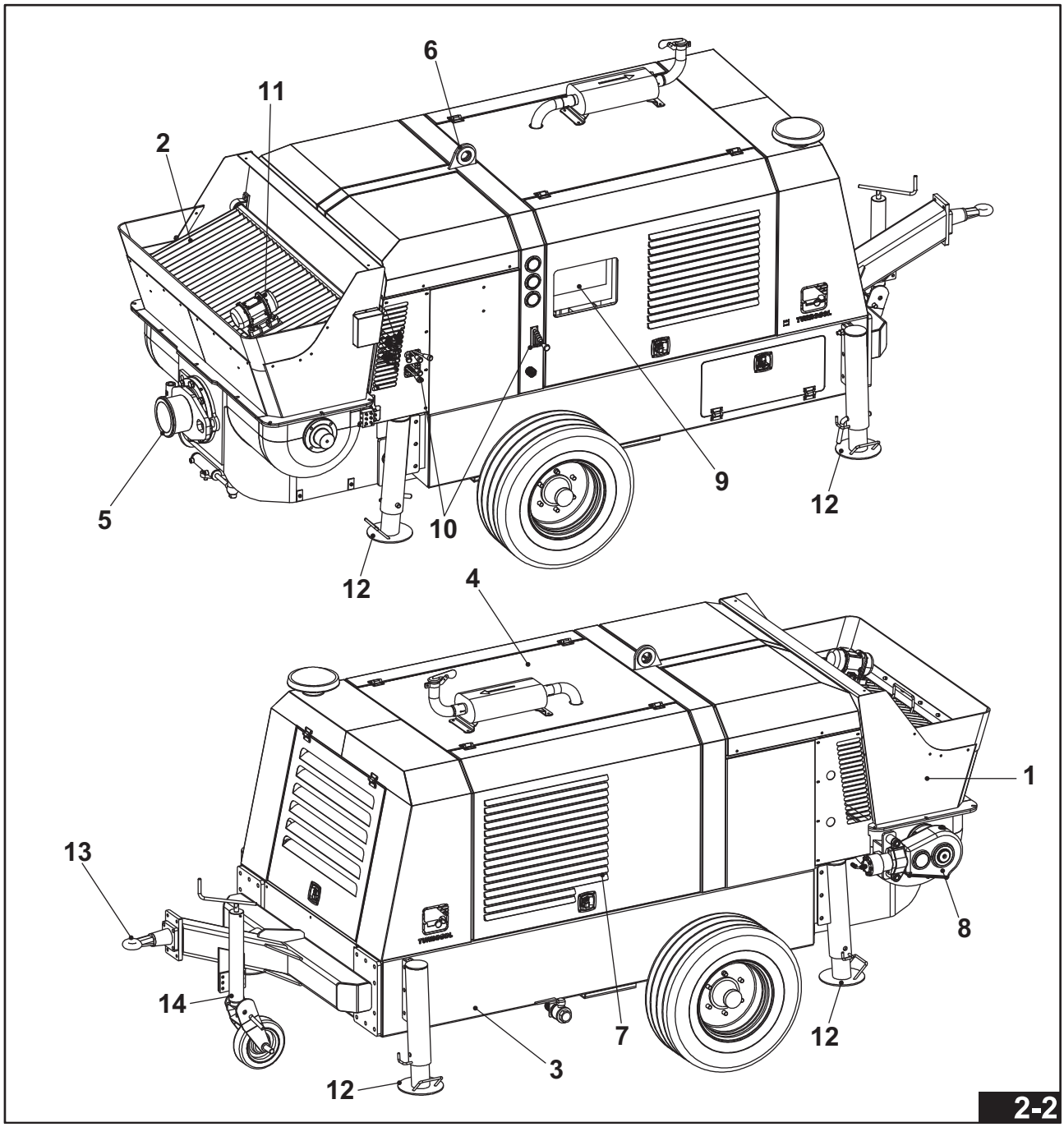
The machine's main unit is the pumping unit. It consists of a lower hopper (FIG.2-1-REF.1) housing the S valve (FIG.2-1-REF.2) and the mixer (FIG.2-1-REF.3). Two hydraulic jacks (FIG.2-1-REF.4) are found behind the hopper, that move the S valve; two cylinders accept the concrete sucked by the hopper. A rubber piston that sucks/pumps the concrete is present in each cylinder; the pistons are moved by hydraulic cylinders. A bowl (FIG.2-1-REF.5) containing water to cool and lubricate the pistons during their run, is found between the concrete cylinders and the hydraulic cylinders.
Fresh concrete is poured inside the hopper; the internal grid preventing oversized aggregate from entering, is fitted with a vibrator to facilitate unload. The concrete is firstly sucked inside the cylinders and then pumped towards the piping. The alternating of sucking/pumping is produced by the S valve alternating communication between the cylinders and the piping.
The pumping system is hydraulically activated, with hydraulic pump at variable flow rate and valves unit distributing the oil. The exchange sequence of the pumping unit is controlled by means of the machine's board.
The control board manages the main machine functions. Pumping start, stop and reversal can be directly controlled by the operator by means of remote control via cable (standard) or radio control (optional).



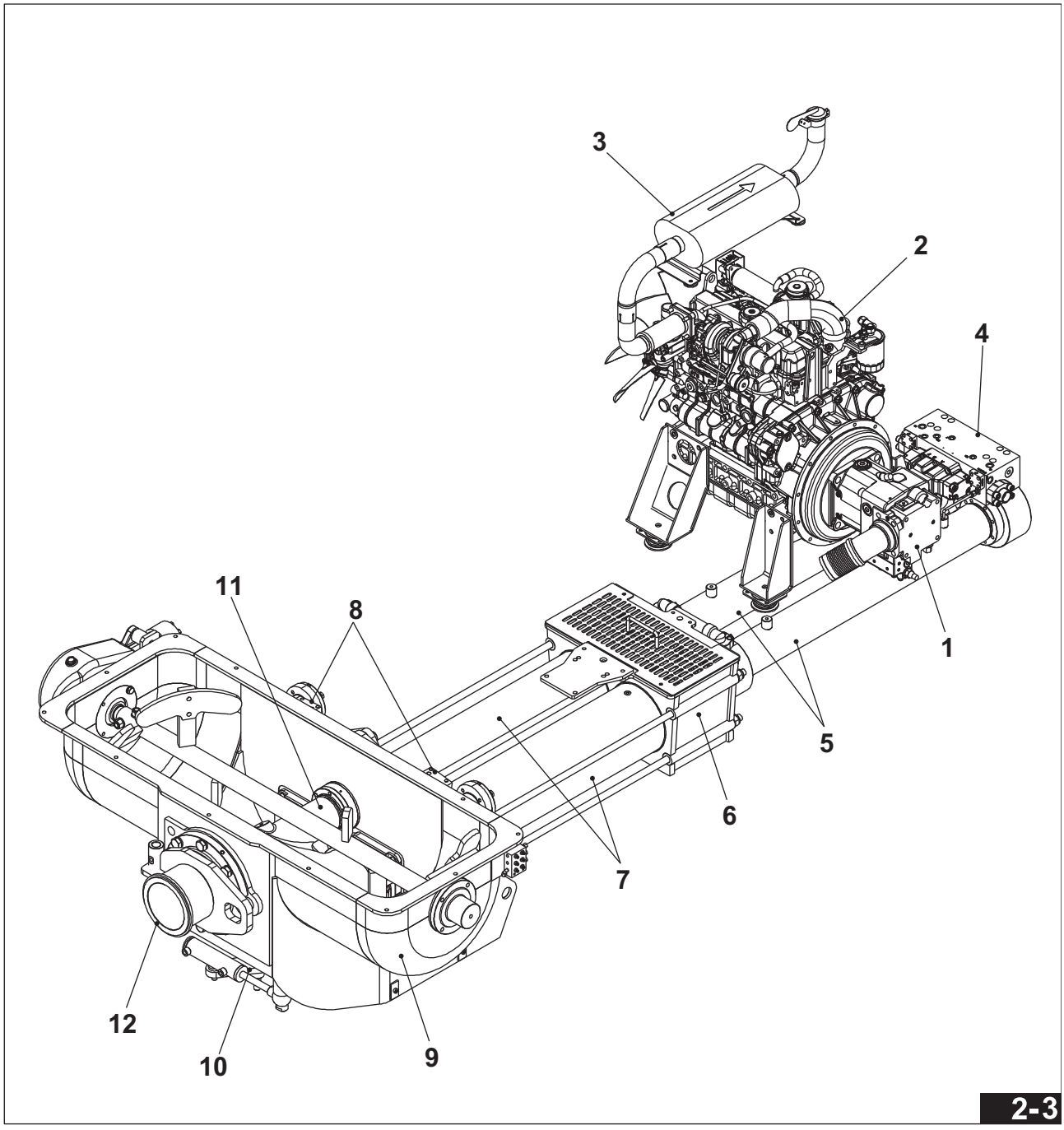
2-1

2.4 MAIN COMPONENTS OF THE MACHINE

1 Hopper
2 Hopper grid
3 Frame
4 Bodywork
5 Discharge manifold
6 Lifting ringbolt
7 Engine cooling air socket
8 Hopper agitator drive
9 Electric control board
10 Controls
11 Vibrator device
12 Outriggers
13 Trailer drawbar
14 Wheel



1 Hydraulic pump
2 Diesel engine, integrated in the machine (see attached manual)
3 Discharge silencer
4 Hydraulic valve unit
5 No.2 hydraulic pumping actuators
6 Lubrication water tank
7 Pumping cylinders
8 No.2 S valve drive hydraulic actuators
9 Lower hopper
10 Hydraulic activation shutter for hopper discharge
11 Exchange S valve
12 Product delivery manifold



2.5 APPLICATION EXAMPLES

The machine is designed for transporting and pumping concrete (mixture of inert materials such as sand and gravel, binder such as cement, water in well defined proportions.

The machine is able to pump the concrete if the mixture components are in such proportions to ensure smoothness along the pipe without creating segregations that clog the ducts.

Other types of product that you wish to treat with the machine, can cause damage to corrosion, temperature, etc. Therefore, contact the manufacturer's technical service.

Product technical data
1.Concrete in general, grout, mixtures for micropiles.
2.Grout spraying (shotcrete) for tunnels, slopes, embankments, swimming pools, channels consolidation and coverings.

All pumpable concrete can be strengthened with flexible or stiff fibres of adequate dimensions and features and sprayed with setting accelerator.

To avoid problems during pumping:
1.the inert's maximum diameter must be between 1/3 and 1/4 of the pipe's diameter,
2.the grading envelope (granulometric curve) of the mix must be suitable for pumping,

2.6 OPTIONALS

- Elastic axle for road tow with brakes and lights bar
- Hydraulic activation water pump 40 l/m - 20 bar
- 3-function radio control
- Accessories and pipes D=125, 100, 75, 65, 50
- Spritzbeton nozzles
- Setting accelerator dose pump synchronised with pumping
- Compressor

3 - SAFETY AND PREVENTION

Prescriptions can be found in the Manual and on the machine, whose purpose is to prevent potential dangers and warn about residual risks. It is important to read and understand them. In case of incomprehensions, please contact the Manufacturer or Dealer.

When a machine is properly used and maintained, it is a safe machine to work with.

Do not use the machine is you are not sure of what you are doing.

3.1 DEFINITIONS

Damage	Physical injury or health damage
Danger	Potential source of damage
Dangerous area	All spaces inside and/or around the machine in which a person may be exposed to a danger
Residual Risk	Risk that remains after taking protective measures
Intended use	Machine use in compliance with the information on use provided in the instructions
Improper use	Incorrect use that does not determined potential accidents
Incorrect use	Prohibited use that if implemented creates a danger
Machine off	Condition in which the engine(s) is stopped and/or the power supply disconnected
Machine cold	Condition in which the engine is turned off by at least two hours

3.2 IMPORTANCE OF THE MANUAL

This Use and Maintenance Manual (hereinafter simply referred to as Manual, if there are no ambiguities of interpretation), was drawn up in compliance with Directive 2006/42/EC. The original Manual language is Italian; the other languages are the translation of the original.

Read the entire Manual before using the machine for the first time: the instructions are basic requirements for the safe use of the product.

The Manual has been organised to better train the operator to use the machine. The Manufacturer has carefully supervised the preparation of the Manual; however, should the operator find it difficult to understand what has been described, please request the necessary explanations from the Manufacturer, Employer or Dealer. Incorrect personal interpretations may affect the use of the machine. The operator must pay the utmost attention to the safety aspects during use and maintenance; he/she must observe the warnings in the Manual and on the machine. The operator must act fully aware of his/her actions, which is essential in respecting the health and safety criteria required by the EU Directives and the relevant national regulations.

The Manual is an integral part of the machine and must be kept with care; it must always be available at the workplace and accessible to anyone appointed to perform activities on the machine. Replace the Manual if lost, damaged or no longer legible.

The instructions in the Manual must be integrated with the laws on safety at work and on respecting the environment. The Manufacturer declines every liability for injuries to persons, damages to animals or property due to the non-compliance with this Manual.

The illustrations in this publication are for the basic understanding of the concepts exposed and may differ from reality.

With the aim of continuously improving the product, the Manufacturer reserves the right to make changes without prior notice.

3.3 RECIPIENTS OF USE

The machine was designed to be operated by the following professional figures:

OPERATOR
Person trained and informed on residual risks, who deals with the supervision and running of the machine. Must be trained on the position of all control and safety commands. The operator must only work with active safety conditions. The operator is also trained to perform tooling tasks within the dangerous area, with the exclusive use of their hands or special tools provided with the machine. The operator must also know the user requirements of cement conglomerates provided by manufacturers through technical and safety data sheets of the product.

There are generally two operators involved and occupy different workstations:
- the first and main operator is on the machine;
- the second operator (generally working at the same time as the first) is in charge of the distribution or projection on the place intended for such activities.

The operators must be able to communicate during the processing phases.

The main operator tasks are:
- possible machine transportation to the site;
- selection of the workplace according to the service conditions;
placing the machine;
- machine tooling for the work phases (piping connection, refuelling, etc.) and preliminary checks before starting the machine;
- running the machine;
- machine supervision during the work phases, including cleaning;
- cleaning the machine;
- routine maintenance of the machine.

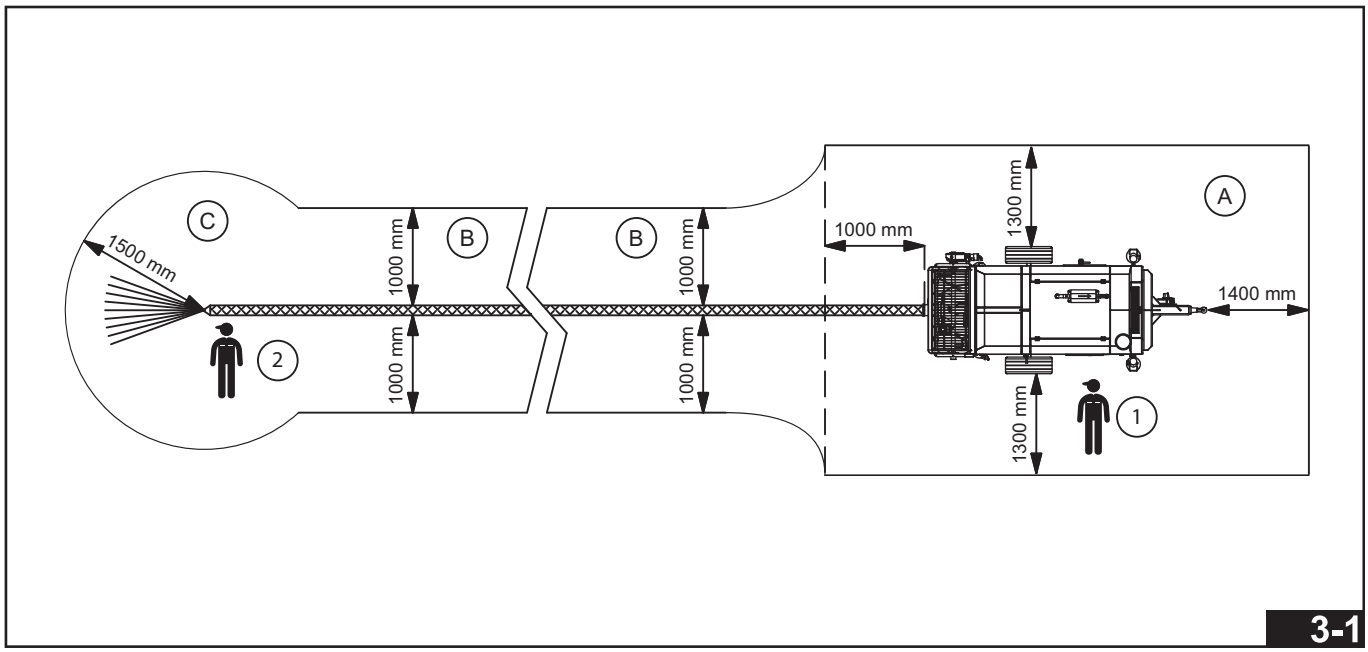
A second operator is required during the distribution and projection of the concrete, whose tasks are:
- distribution or projection of the concrete;
- supervising the distribution or projection area.

Additional personnel required for the performance of the work must be trained on the operations to be performed and informed on relevant residue risks.

With reference to figure 3-1, the areas that can pose risks for the operator (dangerous areas) are:
A - work and tooling area around the machine. This is also the area occupied by the operator during cleaning of the machine. During tooling the fixed guards are closed and locked, the mobile guards and closed or open with machine off. During the work phase under manual operating conditions, the fixed guards are closed and locked and the mobile guards closed.
B - area in which the concrete conveying pipes were laid;
C - area of distribution or projection of the concrete.

The usual operator positions are:
1 on the machine, in front of the control board for running/supervising the machine;
2 inside the area of distribution or projection of the mortar.

The figure also shows the minimum safety distances around the machine that delimit the area within which only the presence of personnel authorised by the user is permitted.



3-1

MAINTENANCE TECHNICIAN

Qualified technical personnel in charge of the extraordinary maintenance of the machine. The maintenance technician is trained and informed on residual risks but with the safety skills of the maintenance personnel to whom the maintenance of the machine is entrusted, except for the internal combustion engine. The maintenance technician must perform all maintenance work which also occurs within the dangerous areas and with movements de-energised and stopped in guaranteed safety. The maintenance technician can also access the electric panel with the equipment live. Furthermore, the maintenance technician must be trained and specifically educated on the manually executable tooling activities or with the use of tools.

The extraordinary maintenance of the engine must be performed by qualified technicians and authorised by the engine Manufacturer. The maintenance technician must perform all maintenance work which also occurs within the dangerous areas and with movements de-energised and stopped in guaranteed safety. The maintenance technician can also access the electric panel with the equipment live. The maintenance technician must be trained and specifically educated on the manually executable tooling activities or with the use of tools.
Refer to the Engine manual for the engine extraordinary maintenance.

The machine maintenance technician tasks are:
- the tooling, calibration, adjustment, cleaning of the machine inner parts (with possible disassembly), maintenance, assistance interventions, troubleshooting, replacement of worn, deteriorated, structural parts (within the dangerous processing area of the machine, with fixed guards closed and locked and additional mobile guards closed or with mobile guards open and movement de-energised and stopped in guaranteed safety), or parts provided and indicated in the Manual.
The interventions can be, for example:
  a) preparing the machine for commissioning, or remove the blocks provided for transport, etc.;
  b) commission the machine, if the manufacturer does not reserve to do it itself;
  c) replace the fluid filters, etc.;
  d) replace the elements subject to wear, including electrical components;
  e) check the state of wear and if necessary replace the flexible hoses of the hydraulic, fluidic system, etc.
- clean the machine inner parts with possible disassembly, maintenance, lubrication, assistance interventions, troubleshooting, replacement of worn, deteriorated, structural parts (within the dangerous processing area, with fixed guards closed and locked and additional mobile guards closed or with mobile guards open and movement de-energised and stopped in guaranteed safety) or parts provided and indicated in the Manual;
- perform the above interventions and as prescribed in the Manual, also removing the fixed guards or fastening systems of each active protection device.

The work area that may endanger the maintenance technician are:
- the area relating to the tooling, calibration, adjustment, repair, lubrication, troubleshooting and replacement of worn or deteriorated parts (parts provided and indicated in the Manual);
- the areas surrounding and inside the machine during the handling of mobile elements;
- the areas surrounding the electrical casings, electric cables, pipes;
- the maintenance area surrounding the engines and related kinematic transmission chains;
- the areas surrounding the fixed and mobile guards;
- the routine and extraordinary maintenance areas;
- the electrical equipment maintenance areas.

3.4 MAIN WARNINGS

The user is responsible for training operators and maintenance technicians and properly implementing the instructions provided.

The use and maintenance of the machine are only permitted to professional, trained and authorised operators and maintenance technicians. The use of the machine is forbidden to people with disabilities and minors.

The Manual must be entirely read and understood before operating with the machine. It must always be available at the workplace and accessible to anyone appointed to perform operations on the machine.

Replace the Manual if damaged or illegible.

The instructions in the Manual must be integrated with the laws on safety at work and on respecting the environment.

Observe the user requirements of the machine in all its life phases, including cleaning.

Only use the machine in if in good technical condition and compliant with its intended use.

Under its normal, and reasonably predictable, operation the machine can only be used for the activities described in this Manual and with the materials (and substances) provided in the Manual and not for other materials (and substances).

No other type of use is permitted except for that described in this Manual; it is not permitted to use the machine beyond the provided limits. Do not perform changes, transformations or applications on the machine that might compromise its safety.

The machine must not be misused; in particular, it cannot be operated with different parameters to those specified and with materials sized or weighing more than the machine capacity.

The machine must not be incorrectly; in particular a) it must not work with the mobile and fixed protection guards open, not properly secured or removed; b) it must not work with the microswitches and safety interlocks deactivates and, in general, with any safety and/or protection device (mechanical, electrical) deactivated and/or not working; c) it must not work if the user has not adopted all measures concerning the elimination of the residual risks indicated in the Manual.

The operator must be in perfect physical and psychological condition to perform his work. Maintain a rational and normal behaviour while using the machine.

Do not consume alcohol or drugs before and while using the machine. Take care with medicines that may cause drowsiness.

Do not use devices (telephones, music players, etc.) that may divert your attention from machine use.

Loose clothing are source of danger. Wear suitable accident-prevention clothing. Do not wear necklaces or rings. Long hair must be kept gathered.

It is forbidden to climb on the machine.

Do not use open flames near the machine.

Always have a first aid kit and fire extinguisher at hand.

Observe the maintenance intervals indicated in chapter 6 of the Manual.

Only use original spare parts.

3.5 SPECIAL WARNINGS FOR THE WORK PHASES

The following paragraphs take into consideration the residual risks present during the various work phases and the requirements to avoid them. There is also a list of additional warnings and information necessary for the safe use of the machine.

3.5.1 Transport

3.5.1.1 Residue risks

The transport operations always involve a residual risk especially due to impacts, running over and/or crushing. These operations require a considerable degree of attention by the workers.

Transport the machine only if disconnected from the accessories (mortar conveying pipes, pneumatic pipes, remote control, etc.).

Transport the machine on vehicles of appropriate size and capacity. Secure the machine to the vehicle with suitable devices, in accordance with the highway code in the country of use. Also secure the accessories provided with the machine (pipes, accessory box, etc.). Avoid unexpected movements.

Use the drawbar to manually move the machine or hook the ball joint to an adequate device. No one, except the personnel appointed by the user, should be within the action range of the moving machine during transportation. The machine weight and the trailer limits of use are indicated in the technical data in § 2.1.

Machine handling on site must comply with the accident-prevention regulations in the country of use and with any further and additional ones of the site itself.

3.5.1.2 Additional warnings for transport as road trailer

If the machine has been registered as road trailer and you want to tow it, you must observe the highway code. The machine cannot be used to transport load, not even accessories (pipes, guns, etc.).

The driving style must be adequate to the traffic and road conditions.

The wear indicator on the joint handle shows the limit of wear (49 mm) of the ball of the towing vehicle. Check the wear indicator before every trip.

Worn parts can cause the vehicle to behave abnormally and the joint to loose safety.

Make sure that the trailer is properly connected to the towing vehicle before every trip.

After the first trip and whenever a wheel is replaced: tighten the wheel fixing studs after a distance of at least 20 km and at most 100 km.

To reduce the formation of white rust on the galvanised parts of the trailer, keep the machine in a ventilated place; after winter trips, clean the galvanised components with clear water (e.g. steam jet).

All extraordinary maintenance, repairs and installation of new parts must be performed by personnel authorised by the trailer Manufacturer. Incorrectly replaced parts or defective can cause damage.

3.5.1.3 P.P.E. to be used




3.5.2 Lifting

3.5.2.1 Residue risks

The lifting operations always involve a residual risk especially due to impacts, running over and/or crushing. These operations require a considerable degree of attention by the workers. The machine weight is given in the technical data in § 2.1.

Do not stand underneath the suspended load.

No person should be near the machine during lifting.

3.5.2.2 Additional warnings

Lift the machine only if clean.

Lift the machine only if disconnected from any device/accessory (mortar conveying pipes, pneumatic pipes, wired-remote control, etc.), with engine off and battery cut-off switch disconnected.

Use suitable lifting means with capacities compatible with the machine weight. Observe the accident-prevention regulations in the country of use.

Only entrust qualified and authorised personnel with lifting operations.

Only use the lifting points indicated by the related safety signals.

3.5.2.3 P.P.E. to be used




3.5.3 Placement

3.5.3.1 Residue risks

The placement operations always involve a residual risk especially due to abrasion, impacts and/or crushing.

Use the drawbar to correctly position the machine.

Stabilise the machine by positioning the parking wedges on the wheels and lower the outrigger feet to the ground.

No one, except the personnel appointed by the user, should be within the action range of the moving machine during placement.

3.5.3.2 Additional warnings

Inspect the work place to verify its suitability before positioning the machine.

The work place must comply with the accident-prevention regulations in the country of use.

Observe the safety distances from the boundaries of the worksite or from uneven ground.

Observe the safety distances from the live parts of power lines.

Position the machine on a levelled surface and consistent ground.

The machine cannot be used in environments where there are potentially explosive atmospheres classified as area 0 or area 1 or area 2.

The machine cannot be used in environments where there are ionising and non-ionising radiations: e.g. microwaves, UV rays, laser, X-rays and similar.

The machine can only operate outdoors. Do not use the machine indoors. Make sure there is always good ventilation.

3.5.3.3 P.P.E. to be used




3.5.4 Use

3.5.4.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate them while using the machine.

DANGERS ARISING FROM THE SAFETY SYSTEM FAULTS
§ 3.6 lists the safety devices and describes their respective operation.

The operator is responsible for daily checking the smooth operation of the safety systems.

In particular:
- with engine started, pressing the emergency buttons must stop the engine;
- the machine functions (pumping, mixing) are only active after pressing the controls enable button;
- with pumping started, the opening of the hopper grid must stop the pumping itself and the function only restarts after pressing the controls enable button;

The operator must only check the operation of the above-said systems, avoid the introduction of objects or body parts during the inspection.

The operator is responsible for stopping the machine and warning the user of the detected failures. The user is responsible for appointing the maintenance technician to solve the failures.

It is forbidden to use the machine when it is not under the normal operational conditions provided.

Do not use the machine with the mobile and fixed protection guards open, not properly secured or removed.

Only use the machine if the safety devices are in perfect working conditions. Do not use the machine with the protection and/or safety devices off and/or not working.

DANGERS ARISING FROM THE EXHAUST GASES OF THE ENDOTHERMIC ENGINE
The dangers arising from the exhaust gases are:
- scalding or burn;
- inhalation;
- fire.

The machine can only operate outdoors. Do not use the machine indoors. Make sure there is always good ventilation.

The close exposure to the silencer exhaust pipe can cause burn. Do not stand in front of the exhaust gas outlet. If you suspect burn, take the person concerned to the hospital.

The exposure to exhaust gases may be source of discomfort or irritation of the respiratory tract. Do not stand in front of the exhaust gas outlet. If you suspect intoxication, take the person concerned to the hospital.

Do not expose dry grass, mown glass, oil or other combustible materials to the exhaust gas.

DANGERS ARISING FROM CONTACT WITH THE MACHINE HOT PARTS
The dangers arising from contact with hot parts are:
- scalding or burn;
- fire.

Do not touch the machine hot parts, such as the silencer or radiator. Wait at least two hours after turning off the engine.

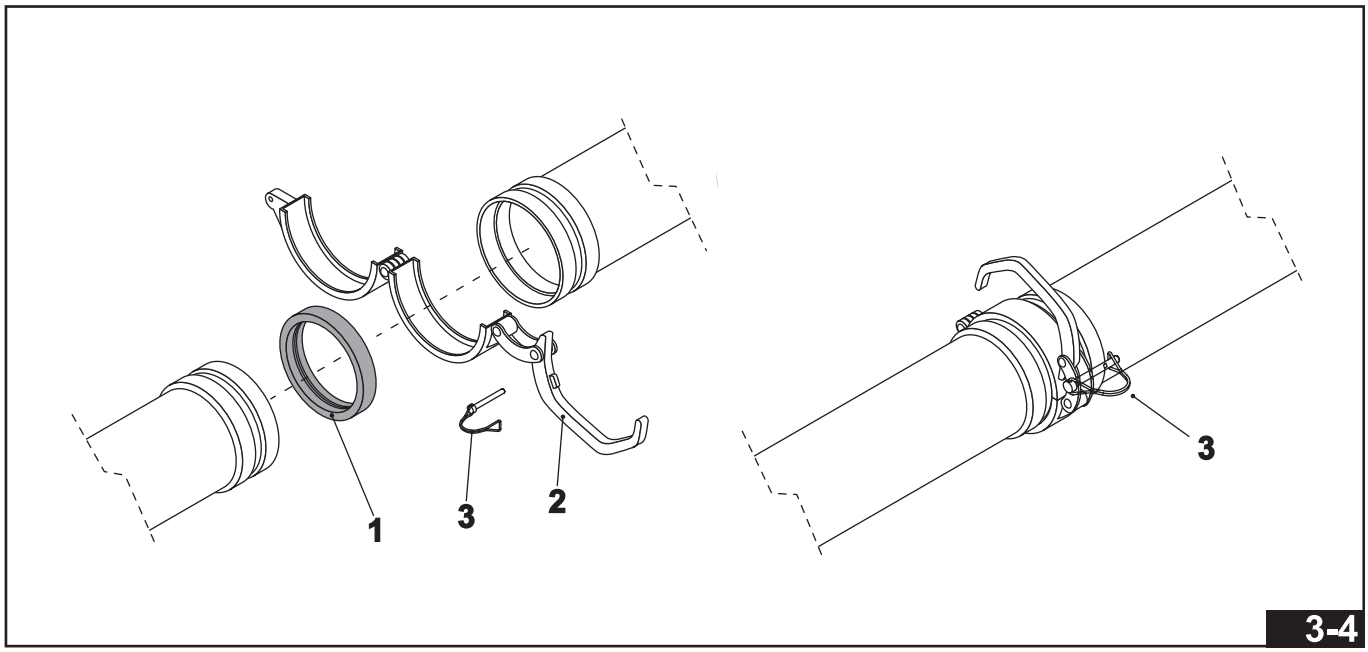
To prevent fire, pay attention to possible leaks of flammable substances, for example from hydraulic pipes and fuel pipes.

DANGERS ARISING FROM THE PROJECTION OF PRESSURISED FLUIDS

The sources of danger are the concrete conveying pipes.
The arising dangers are:
- cutting of the pipes;
- projection of fluids with consequent damage to the eyes and/or parts exposed to the projection.

Verify daily the integrity of the pipes connected to the machine (conveyor pipes). If in doubt, replace with new and original ones. The control procedure is described in the maintenance chapter.

Check the rubber gasket is present, fully fasten the lever and insert the safety pin when connecting the piping segments (Fig. 3-4)



3-4

Do not disconnect the material conveying pipes from the machine if they are pressurised. Always discharge the residue pressure and then disconnect them. In the absence of pressure the pipes sag when stepped on.

DANGERS ARISING FROM CONTACT WITH THE LUBRICANTS

Refer to the residual risks in the Maintenance paragraph.

DANGERS ARISING FROM THE USE OF FUEL (DIESEL)

The dangers arising from the improper use of fuel (diesel) and its container are:
- slipping and falling;
- skin irritation;
- fire.

Accidental leaks make the surface very slippery. Clean adequately.

Wear adequate accident-prevention clothing when handling the fuel.

Do not use open flames or smoke when handling the fuel.

DANGERS ARISING FROM THE EMISSION OF OVERHEAD NOISE
The overhead noise emission values are shown in the technical data.

Use adequate P.P.E. to protect hearing.

DANGERS ARISING FROM THE VIBRATIONS TRANSMITTED TO THE UPPER LIMBS
The vibration emission values are shown in the technical data.

Use adequate P.P.E. to protect the upper limbs.

DANGERS ARISING FROM THE FALLING OF OBJECTS
The dangers arising from the falling of objects occur during machine tooling and hopper loading; they are:
- impact;
- crushing;
- tripping and falling;
- projection of concrete.

Carefully handle the objects used during machine use, such as, for example, tools, machine mobile parts (e.g. grids).

The area around the machine must be free from any encumbrance.

DANGERS ARISING FROM INADEQUATE LIGHTING

The service conditions indicate the lighting required in the work environment. Greater lighting in the work environment may be required during certain operations (such as, for example, routine and extraordinary maintenance). If the lighting of the work environment fails, it is necessary to stop working and restore adequate lighting.

DANGERS ARISING FROM A REASONABLY FORESEEABLE MISUSE
These are dangers originating from the operator's behaviour during machine use.

Observe the user requirements of the machine in all the its life phases, including cleaning.

Do not abandon the machine during its running/control.

3.5.4.2 Additional warnings

Cordon off the dangerous area to keep unauthorised personnel out.

Do not use the machine in case of malfunctions or absence of parts.

Check the machine at least once before each shift to check for damage and defects. The operator must immediately stop using the machine and report any irregularities to the user. The user is obliged to resolve the fault before the machine is used again.

Make sure that switching on the machine does not endanger anyone.

Stop the machine by pressing the emergency button only in emergencies or dangerous situations.

3.5.4.3 P.P.E. to be used

3.5.5 Maintenance

3.5.5.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate the same while using the machine.
For added safety during machine maintenance, also consider the residual risks set out in the previous paragraphs.

DANGERS ARISING FROM THE LUBRICANTS
The dangers arising from the lubricants, are:
- damage to eyes and skin;
- inhalation and/or ingestion of harmful substances;
- slipping and falling;
- dispersion in the environment.

Use suitable accident-prevention goggles and gloves when handling the lubricants.

Place suitable containers under the machine when performing maintenance related to the systems' fluids (engine oil, hydraulic oil, etc.).

Ensure sufficient ventilation when handling lubricants and keep away from combustible substances.

Accidental ingestion may cause harmful effects on the central nervous system.

The inhalation of fumes, steam and aerosol may cause a slight irritation of the respiratory tract. Move the person concerned outdoors.

In case of ingestion, take the person concerned to the hospital immediately. Do not induce vomiting to avoid the risk of aspiration in the respiratory tract.

In case of contact with the skin, take off the contaminated clothing. Thoroughly wash the contaminated parts with soap and water.

In case of contact with eyes, rinse immediately with plenty of water, keeping the eyelids open for at least 15 minutes.

In case of suspected aspiration, immediately take the person concerned to the hospital.

Do not discharge into drains or waterways, wells and in the environment in general. Lubricants must be disposed of according to law.

Empty containers may contain flammable or explosive vapours. Cloths soaked with lubricant, paper or other materials used to absorb the product leaks are a fire hazard. Avoid their accumulation. Remove them immediately after use in accordance with the safety measures.

Avoid storing lubricants outdoors. Store at room temperature, protected from humidity, away from sources of ignition.

The lubricants have a dangerous reaction with strong oxidants.

Accidental leaks on the ground make the floor very slippery.

Keep the location properly ventilated. Check the pouring point. Do not smoke.

In case of accidental dispersion:

Prevent the product from entering sewers and waterways; recover with the help of physical devices (e.g.: pumping); warn the competent authorities when the situation cannot be effectively and quickly resolved. Warn the competent authorities if the product is dispersed in waterways or sewers.

Accidental leaks on the ground make the floor very slippery.

Keep the location properly ventilated. Check the pouring point. Do not smoke.

DANGERS ARISING FROM ENGINE MAINTENANCE

The dangers arising from engine maintenance are covered in the Use and maintenance instruction manual of the engine itself.

Read and understand the Engine manual provided with the machine.

Repairs and extraordinary maintenance must be performed by qualified personnel and authorised by the engine Manufacturer.

Do not use petrol as fuel.

To avoid fires, keep the engine clean and without dirt, grease and waste.

Wear suitable accident-prevention clothing when handling the engine fluids and spare parts (anti-freeze, oil, filters, etc.).

ELECTRICAL HAZARDS

The electrical hazards arise from the electrical system maintenance operations and are:
- electrocution;
- chemical effects;
- burn;
- fire.

The wiring diagram must be understood before working on the machine.

Disconnect the battery cut-out switch before working on the electrical system.

The battery negative pole (-) is connected to the chassis (mass). To avoid sparks caused by short-circuits and consequent damages, always disconnect the negative pole (-) first and then always reconnect it last.

Repairs and extraordinary maintenance must be performed by qualified personnel.

If the battery is frozen, do not charge it or attempt to start the engine as there is a risk of explosion. To reduce the risk of the electrolyte freezing, keep the battery fully charged. If frozen, warm it properly.

Do not use or charge the battery if the electrolyte level is below the minimum notch. Add distilled water until the level is between minimum and maximum.

Only check the charge status with voltmeter or densimeter.

The battery may emit potentially explosive gases. Do not use naked flames or smoke near it.

The battery electrolyte is toxic and corrosive. Do not inhale the gases. Wear adequate accident-prevention clothing when before handling the electrolyte.

DANGERS ARISING FROM HYDRAULIC SYSTEM MAINTENANCE

The risks associated with the hydraulic system are:
- burn;
- injection;
- cutting;
- impact and crushing;
- perforation;
- dangers arising from handling lubricant fluids.

The hydraulic diagram must be understood before working on the machine.

Maintenance interventions requiring the disassembly of components must take place with the machine off and cold.

Do not start the machine even if only one pipe is disconnected. Disconnect the battery cut-out switch before working on the plant.

Repairs and extraordinary maintenance must be performed by authorised maintenance technicians.

Pressurised fluid jets can penetrate the skin and cause damage. Before disconnecting any pipe, make sure there is no residual pressure inside (the circuit pressure gauge must be at zero bar). Wear adequate accident-prevention clothing (gloves, goggles).

Replace damaged pipes, gaskets, O-rings or fittings.

Maintenance interventions requiring the disassembly of components must take place with the machine off and cold.

Do not start the machine even if only one pipe is disconnected. Disconnect the battery cut-out switch before working on the pneumatic system.

Repairs and extraordinary maintenance must be performed by authorised maintenance technicians.

Before disconnecting any pipe, make sure there is no residual pressure inside (open all system valves). Wear adequate accident-prevention clothing (gloves, goggles).

The pipes must always be in good conditions. The procedure for checking the pipes is set out in § 6.1.9.

3.5.5.2 Additional warnings

The machine must be adequately cleaned before any maintenance intervention.

Routine maintenance is the user's responsibility. It must be carried out in adequately equipped workshops.

Extraordinary maintenance and any repairs must be carried out by authorised maintenance technicians, and in adequately equipped workshops.

Extraordinary maintenance and any repairs of the endothermic engine must be performed by personnel authorised by the engine Manufacturer.

Cordon off the area where the maintenance or repair is carried out; it must be evident (e.g. through warning signs) that the machine is under maintenance and that it cannot be used normally.

Immediately replace the faulty components involved in the safety functions. These components must be replaced by maintenance technicians authorised by the Manufacturer.

If it became necessary to neutralise the safety systems (interlocked fixed guards, safety switches, etc.), restore them before reusing the machine.

If it is necessary to intervene under the machine, make sure that it is fixed and secured.

Disconnect the battery cut-out switch before any maintenance or repair (e.g. bonnet open) to prevent unexpected start-ups.

Do not leave tools or other objects on the machine or inside it at the end of the interventions.

Only use original spare parts.

3.5.5.3 P.P.E. to be used

3.5.6 Disposal

3.5.6.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate them during the machine disposal.
For added safety during machine disposal, also consider the requirements in the previous paragraphs.

DANGERS ARISING FROM THE LUBRICANTS
In this phase, the dangers arising from the lubricants, are the same set out in the maintenance paragraph.

ELECTRICAL HAZARDS
The electrical hazards arise from the failed isolation of the battery and are:
- electrocution;
- chemical effects;
- burn;
- fire.

Disconnect the battery cut-out switch before working on the electrical system.

The battery negative pole (-) is connected to the chassis (mass). To avoid sparks caused by short-circuits and consequent damages, disconnect the negative pole (-) first.

The battery may emit potentially explosive gases. Do not use naked flames or smoke near it.

The battery electrolyte is toxic and corrosive. Do not inhale the gases. Wear adequate accident-prevention clothing when before handling the electrolyte.

DANGERS ARISING FROM THE DISASSEMBLY OF MECHANICAL PARTS IN GENERAL
The risks associated with the disassembly of machine parts are:
- cut;
- entrapment;
- falling;
- impact and crushing;
- dangers arising from handling lubricant fluids.

Handle the parts being disassembled with care and attention; move them using adequate devices, compatibly with the weight and shape of the component. Do not leave the disassembled components where they could be of hindrance.

DANGERS ARISING FROM THE DISASSEMBLY OF THE HYDRAULIC SYSTEM
The risks associated with the hydraulic system are:
- burn;
- injection;
- cutting;
- impact and crushing;
- perforation;
- dangers arising from handling lubricant fluids.

The components must be disassembled with the machine off and cold.

Pressurised fluid jets can penetrate the skin and cause damage. Before disconnecting any pipe, make sure there is no residual pressure inside (the circuit pressure gauge must be at zero bar). Wear adequate accident-prevention clothing (gloves, goggles).

The components must be disassembled with the machine off and cold.

Before disconnecting any pipe, make sure there is no residual pressure inside (open all system valves). Wear adequate accident-prevention clothing (gloves, goggles).

3.5.6.2 Additional warnings

Cordon off the area where the disposal is carried out; it must be evident (e.g. through warning signs) that the machine cannot be used normally.

If it is necessary to intervene under the machine, make sure that it is fixed and secured.

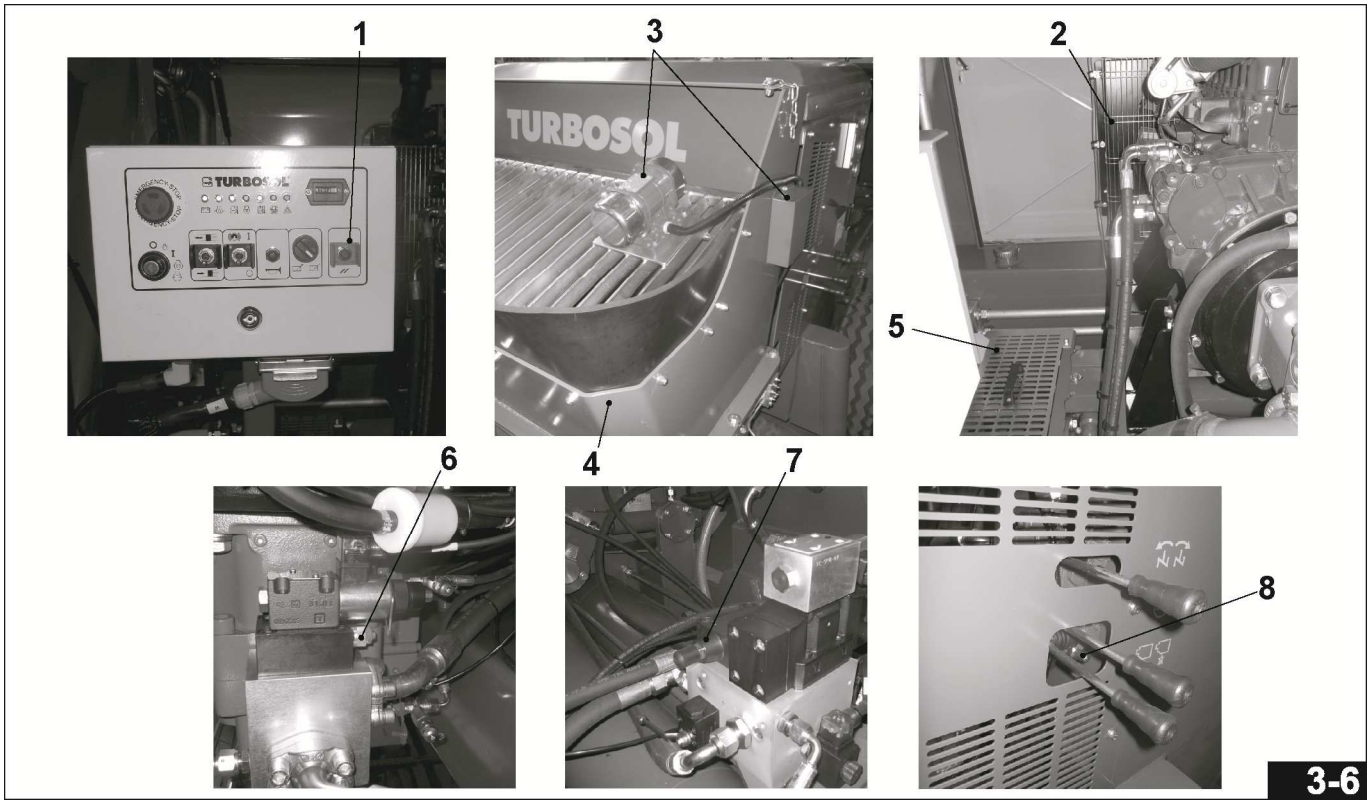
3.5.6.3 P.P.E. to be used

3.6 SAFETY DEVICES

The machine is equipped with the following safety devices:

1	**CONTROLS ENABLE BUTTON** Pressing the button after starting the engine enables pumping and mixing; when the hopper grid is opened the pumping or mixing do not automatically restart, but it is necessary to press the button.
2	**BELT AND ENGINE COOLING FAN GRIDS** Fixed guards. Narrow mesh grids secured to the engine to segregate the cooling fan and the belt driving the fan and to prevent contact with the upper limbs.
3	**HOPPER GRID** Interlocked mobile guard, PL=c in compliance with EN ISO 13849-1:2008. Avoids exposure to moving parts. The solenoid valve controlling the pumping is de-energised when the grid is opened. When the grid is opened the moving parts stop in a very short time (less than 1 sec). The pumping can only be started if the grid is closed and the controls enable button pressed.
4	**HOPPER BASE** Fixed guard. Shaped steel sheet panels fastened with screws to the machine structure, form the hopper base and segregate the “S” valve and the agitator device, preventing reaching with the limbs.
5	**LUBRICATION WATER TANK GRID** Fixed guard. Metal grid fastened with screws to the lubrication tank, to segregate the stems of the actuators that drive the pumping pistons.
6	**PRESSURE RELIEF VALVE OF THE PUMPING HYDRAULIC CIRCUIT** They limit the maximum pressure of the circuit.
7	**PRESSURE RELIEF VALVE OF THE EXCHANGE JACKS** It limits the maximum pressure of the circuit.
8	**PRESSURE RELIEF VALVE OF THE SECONDARY HYDRAULIC CIRCUIT** It limits the maximum pressure of the circuit (mixing and water pump)

Tab. 3-1



Periodically check the proper operation of the safety devices.

With regard to the fixed guard, we also state that:

1.the dimensions of the fixed guards are such not to leave openings in the protected dangerous work area when fixed in the seat
2.the fixed guards that are not permanently welded to the machine are fixed by screws that require the use of special keys (Allen keys) and can be removed with appropriate key, only by the maintenance personnel
3.access to the compartments protected by fixed guard is only permitted to the maintenance technician In any event, the operator must never attempt to open a fixed guard
4.it is not possible to reassemble a guard in the wrong position so as to leave dangerous openings in the fairing
5.if the guards are not secured in their seats with the special screws, they cannot remain apparently closed and resting in that seat without the fixing elements
6.in case the fixed guard fixing systems are lost, the same type or equivalent systems must be reused which, in any case, require the use of tools.

Do not tamper with the safety devices. Do not use the machine if the safety devices are malfunctioning. Replace the safety devices with original spare parts.

3.7 SIGNS ON THE MACHINE

The machine is fitted with labels having different purposes:

Danger
They inform the operator to act with caution and attention since there is a latent danger. The prohibition sign is triangular with a black frame, yellow background and black mark.

Prohibition
They inform the operator on the prohibition to perform certain actions or have certain behaviours that can compromise health. The prohibition sign is round with a red edge and diagonal stripe, white background and black mark.

Obligation
They inform the operator on the obligation to use protective means or have certain behaviours. The obligation sign has a blue background and white mark.

These labels are placed on the machine parts where there is a residual risk.

Information
They inform the operator on specific functions.
These labels are positioned immediately near the element to which they refer. (The machine controls are described in § 5.3).

Keep the signs clean.

It is forbidden to remove the signs.

Replace worn and/or illegible signs.

DANGER SIGNS				
				
Danger of electrocution	Burning hazard	Danger of explosion	Danger flammable battery gases	Danger inhalation exhaust fumes

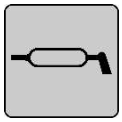
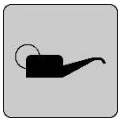
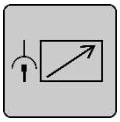
Tab. 3-2

PROHIBITION SIGNS				
				
Use prohibited to unauthorised persons	It is prohibited to perform work before electrically isolating the electrical equipment	It is prohibited to remove the safety devices and protections	It is prohibited to put out fires with water	It is prohibited to work with the bonnet open

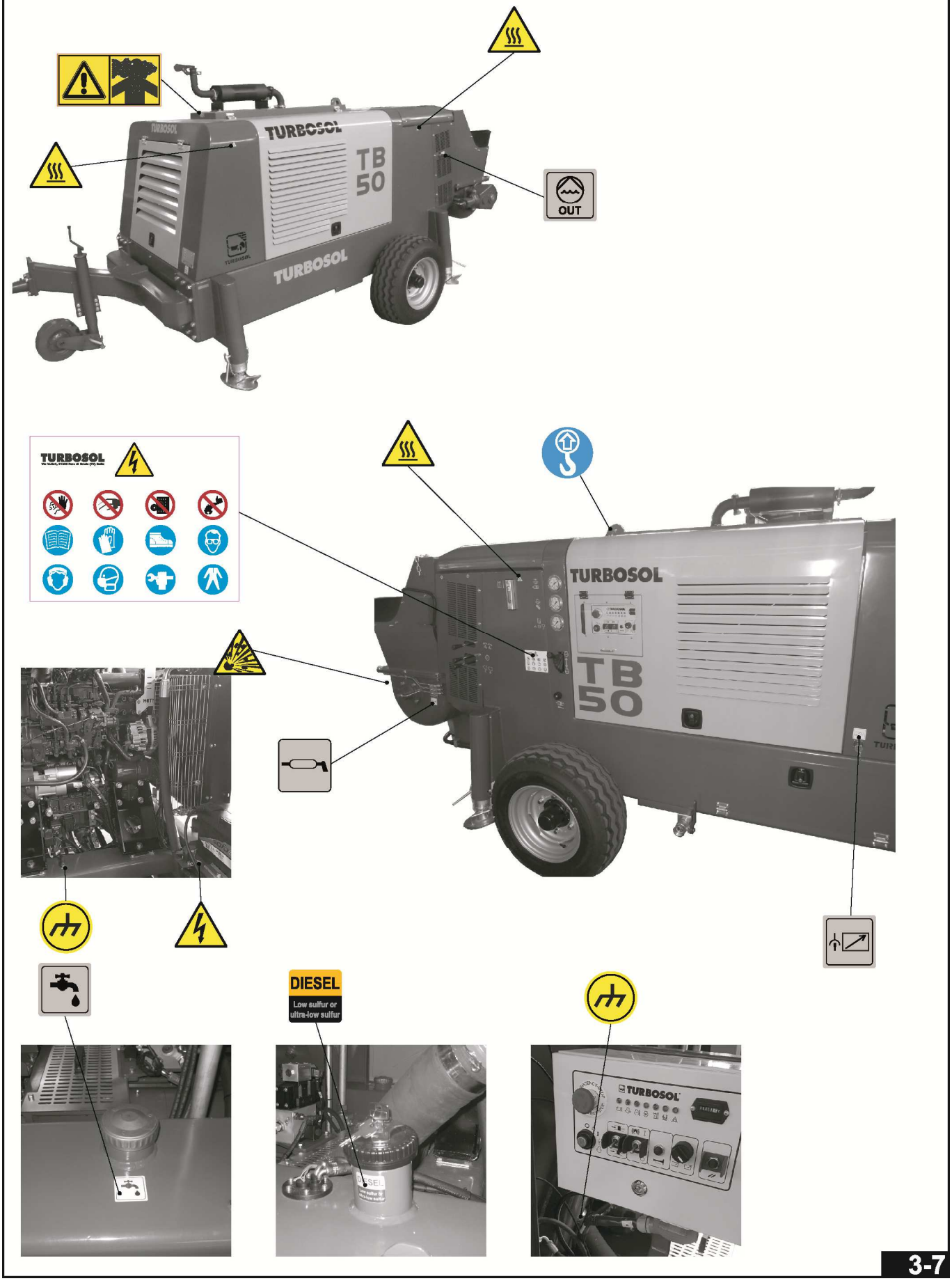
Tab. 3-3

COMPULSORY SIGNS				
 Body protection	 Protective helmet	 Protective gloves	 Safety footwear	 Protect the respiratory tracts: mask (Category II)
 Eye protection	 Hearing protection	 Read the use and maintenance manual before working	 Maintenance performed only by qualified personnel	 Lifting points

Tab. 3-4

INFORMATION			
 Chassis (mass)	 Water connection	 High pressure washer delivery	
 Grease	 Lubricant oil	 Remote control connection	

Tab. 3-5


TURBOSOL
TB 50
OUT
TURBOSOL
TURBOSOL
TB 50
DIESEL
Low sulfur or ultra-low sulfur
TURBOSOL

3-7

4 - TRANSPORT AND INSTALLATION

4.1 LIFTING

Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.2.

- The machine must be transported as close as possible to the place intended for use, which must have been previously verified for dimensions and space required, including those essential for the installation manoeuvres.

- Do not lift loads over people. In these cases, lower the load or move the people away from the handling area.- When using a lifting mean to handle a machine, make sure that the hooking and lifting pins are correctly arranged.Take the necessary precautions to prevent dangerous overloads due to acceleration, deceleration or impact forces.- Before lifting a load, make sure that it is well secured and correctly balanced in the lifting device.- Make sure that the slings used for lifting are in good condition and suitable for the type of work to be performed.- Make sure that the safe work load of the crane is greater than the weight to be lifted.- Before moving the structures, always make sure that the handling area is not occupied by personnel or objects that may be cause of danger.- Do not move any structure in case of poor lighting and/or visibility until a supervisor has ascertained the necessary freedom of movement within the work area; do not assume that the work area is free, but always visually ascertain it.- Electrically and mechanically block all moving parts of a structure
r equipment that must be transported.

The lifting and handling, depending on the type of functional unit, must take place by strictly observing the following and can be performed with:

1.handling FROM ABOVE.

DO NOT LIFT LOADS OVER PEOPLE

IN THESE CASES, LOWER THE LOAD OR MOVE THE PEOPLE AWAY FROM THE HANDLING AREA.
The functional units equipped with lifting eyebolts must be lifted and handled by means of lifting, by introducing the lifting accessories or the same lifting hooks in the eyebolts located in the upper area of the same functional unit.
The functional unit eyebolts are appropriately marked by the symbol, see “Compulsory signs” in chapter 3.

The machine is lifted by inserting the hook in the eyebolt indicated with the arrow (Fig. 4-9).
Raise the machine by a few centimetres and check that the load is properly balanced.

4-9

4.2 INSTALLATION

4.2.1 Placement

Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.3.

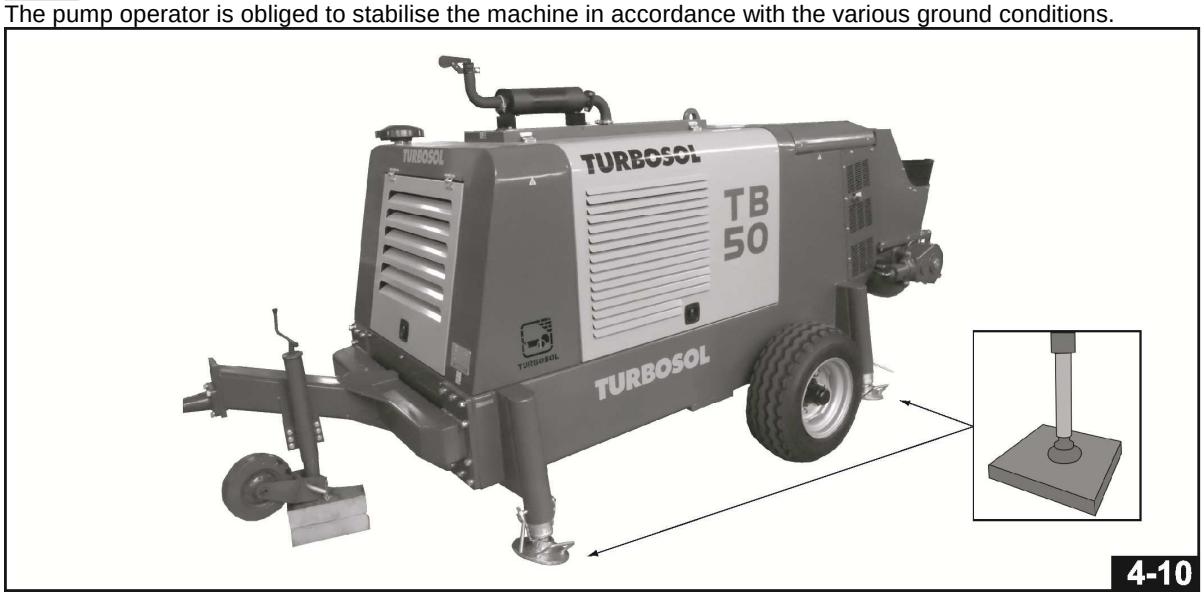
In particular, refer to paragraph 3 (Fig. 3-1) for the positioning layout.
Find a safe and efficient position. The ground must comply with the requirements of § 2.1. Lower the stabilising feet to the ground, first the rear ones, then the front ones with the aid of the wheel.

The machine stability is designed so that, under the provided operating conditions, it allows its use without risk of overturning, falling or unexpected movement.

The machine has been designed and built to rest on wheels and on outriggers.In order to avoid mechanical stresses during normal use, without causing excessive strain for the structure, during lifting the machine must be stable.
- Once at the site, place barriers and warning signs around the work area of the machine, near traffic routes or pedestrian passages, so as to prevent any person or mean access to the area.
- No one except the operator (responsible for the machine and its functionality) must remain near the work area of the machine.
- Bring the machine to the work position and make sure the ground is firm and flat.
- Make sure that there are no people or things in the machine's operating range.

If the ground is not solid enough, use distribution plates or compact timber suitable to better distribute the outriggers' pressure on the ground.

The pump operator is obliged to stabilise the machine in accordance with the various ground conditions.



4.2.2 Pipe connection

Check the pipes, gaskets and fittings as described in § 6.1.6-7-8-9.

Lay the pipes and avoid them from twisting during material conveying. The first ten metres of piping are subject to oscillations (a few centimetres) during transport: it is advisable to raise this section from the ground and prevent it from resting on edges or abrasive elements.

Anchor the pipes properly:

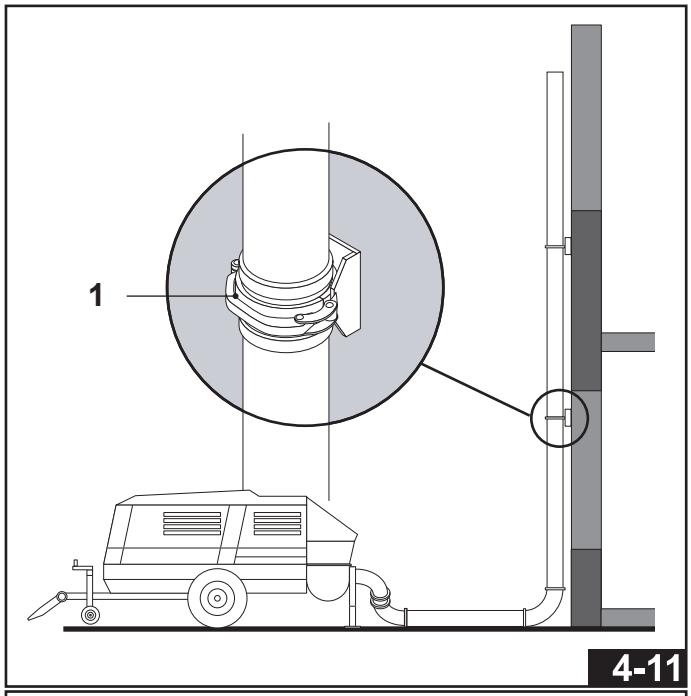
- Horizontal pumping
Lay piping as desired and connect it to the first section previously described to pump material horizontally.

- Vertical pumping
The vertical piping section must be fixed and supported using the appropriate collars (FIG. 4-11).

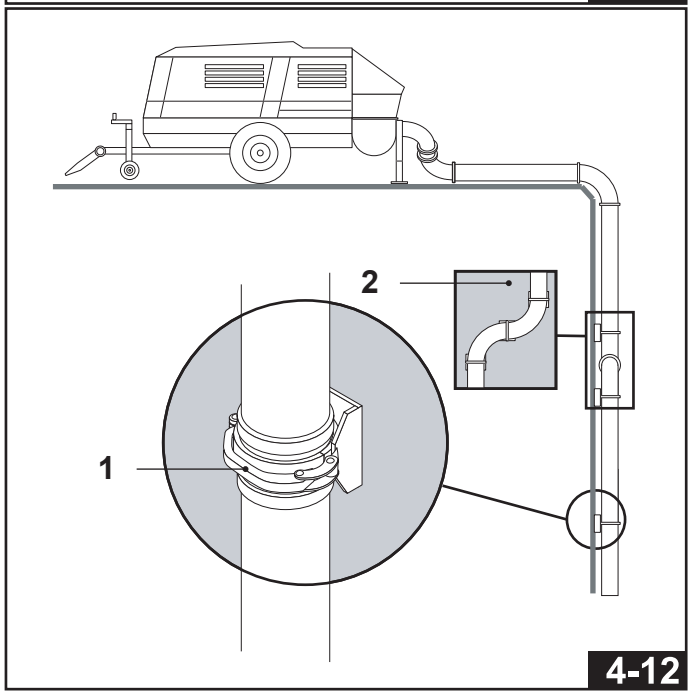
- Downward pumping

The downward piping section must be fixed and supported using the appropriate collars (FIG. 4-12).

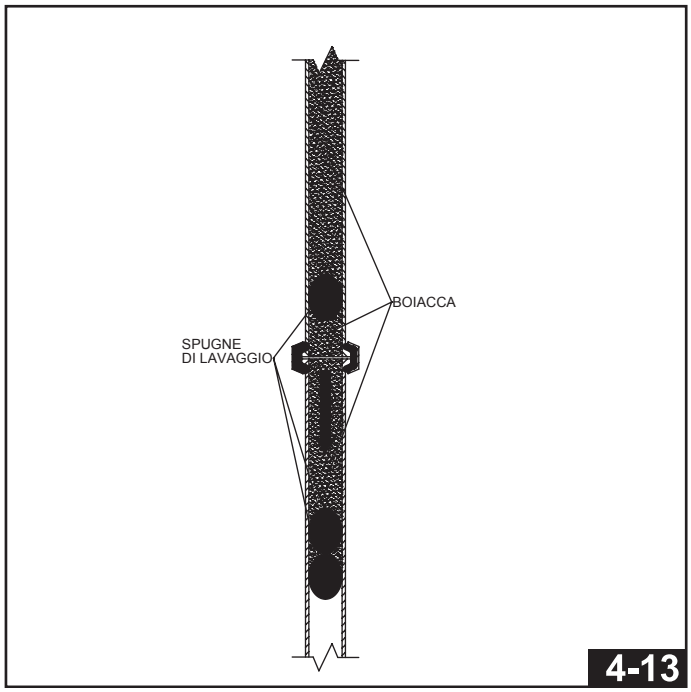
Arrangements must be made to stop the concrete fall in the downward section (e.g. assemble a bend or S-bend - as in FIG.4-12 or make tilted sections). For this type of layout, we recommend lubricating pipes with grout as follows:
- introduce two wash sponges in the piping's initial section (FIG. 4-13).
- Pump the grout. The entire internal surface of the downward section will, in this way, be lubricated.
Introduce more sponges and more grout if the downward section is particularly long.



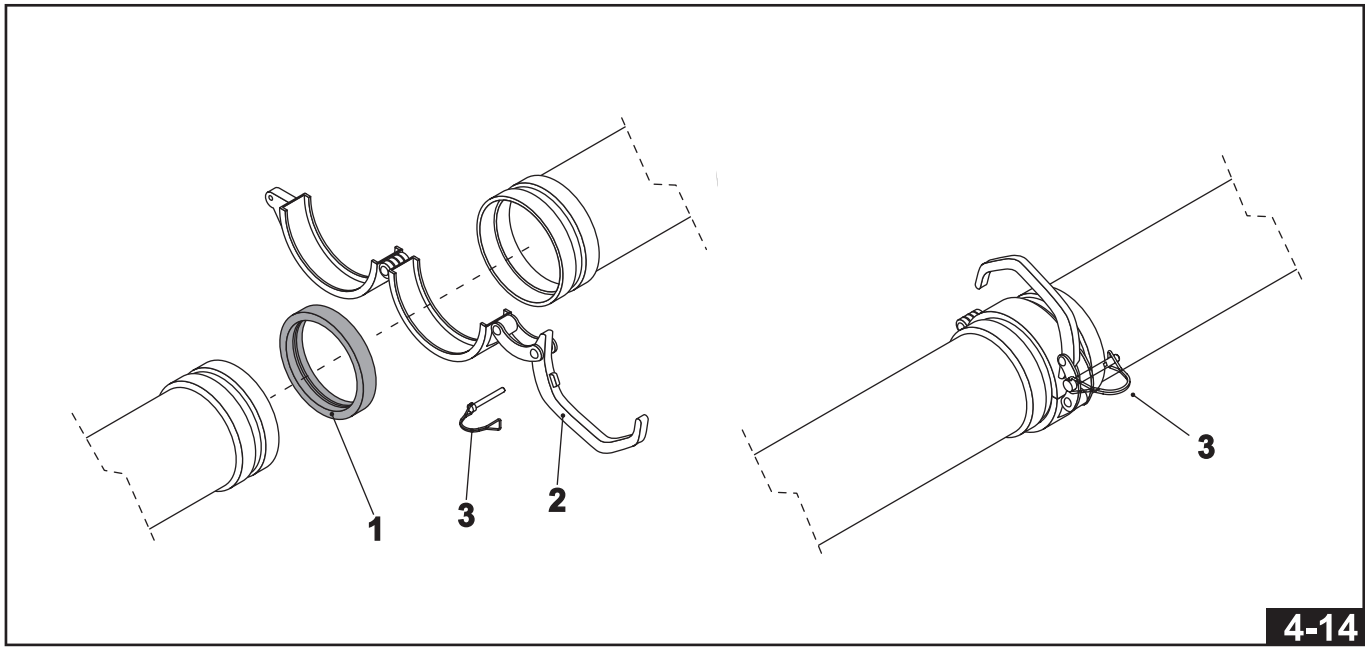
4-11



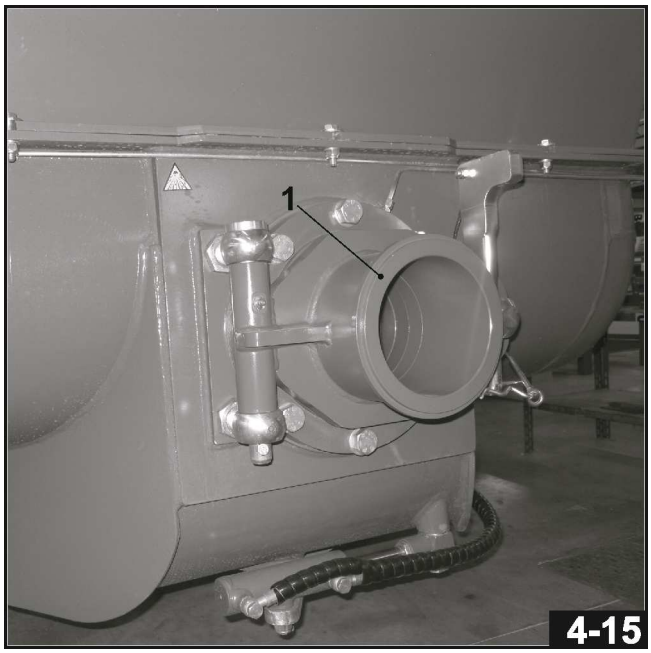
4-12



Connect the pipes ensuring the presence of gasket 1, fully tighten fittings 2 and secure them with split pins 3 (Fig.4-14).



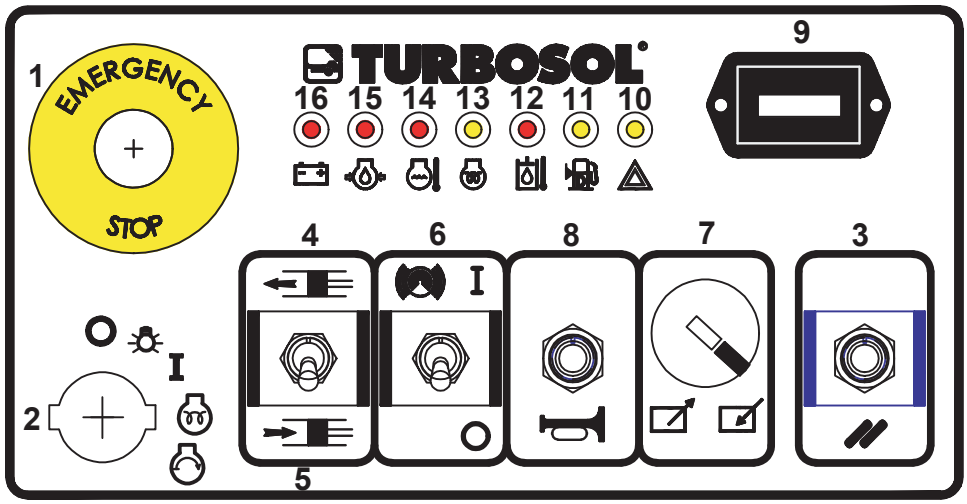
Connect the mortar conveyor piping 1 (Fig. 4-15).


1
4-15

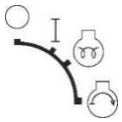
5 - USE AND OPERATION

5.1 ELECTRIC CONTROL BOARD

CONTROLS



5-1

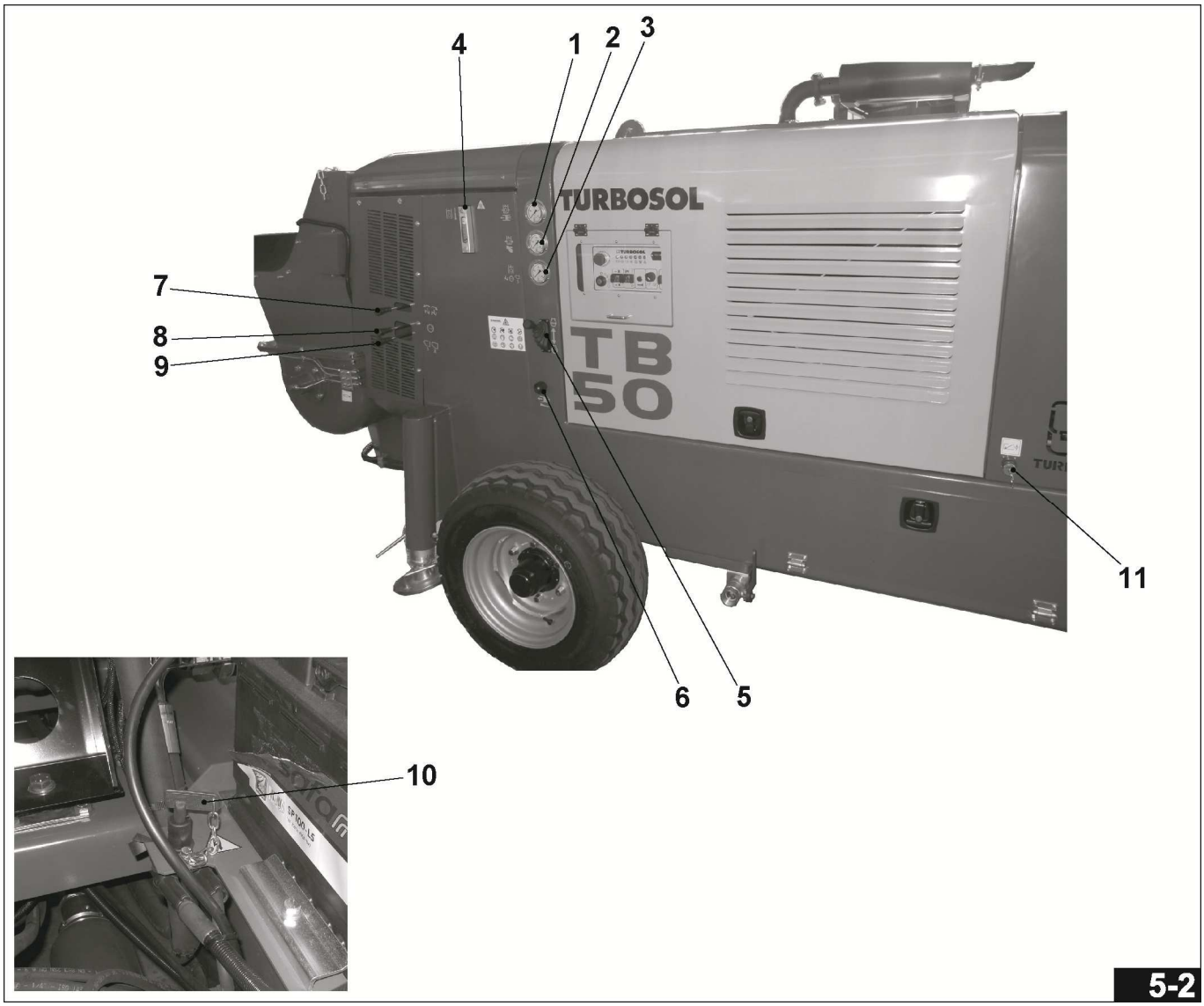
1		**EMERGENCY BUTTON** If pressed, it stops the engine.
2		**IGNITION KEY** Key insertion/key disconnection/Engine off. First click: general power supply. Second click: the glow-plugs pre-heat takes place by holding the key in this position. The engine can be started when the glow plug indicator light switches off. Third click: ignition. Release when engine has started.
3	//	**CONTROLS ENABLE BUTTON** Press the button after starting the engine, in order to enable the electric board functions. The pumping is inhibited when the hopper grid is opened. To restore the function, close the grid and press the button //. The indicator light 10 lights up when the safety devices intervene; the indicator light turns off, after closing the grid and pressing the button //.
4		**PUMPING** Stable position. The pumping is enabled in this position. The pumping is started and stopped by means of the remote control via cable or radio remote control.
5		**INTAKE** Stable position. The intake is enabled in this position. The intake is started and stopped by means of the remote control via cable or radio remote control.
6		**VIBRATING SCREEN** Stable position. The selector enables/disables the motor vibrator on the hopper grid.
7		**REMOTE CONTROL** Stable position. The selector enables the local / remote control.
8		**HORN** Unstable position. Button for acoustic warning.

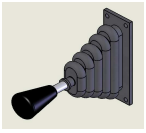
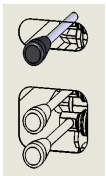
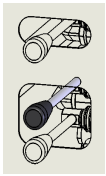
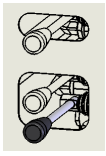
Tab. 5-1A

9		**HOUR METER** When the engine is started, the hour meter starts counting the machine time of operation.
10		**SAFETY DEVICES INTERVENTION INDICATOR (YELLOW)** It lights up when the hopper grid is opened. The indicator turns off when you press the button //.
11		**FUEL RESERVE INDICATOR (YELLOW)** It lights up if the fuel tank reserve activates.
12		**HYDRAULIC OIL TEMPERATURE INDICATOR (RED)** When lit during the engine operation, it indicates high hydraulic oil temperature; the control system stops the engine after 5 seconds from switch-on.
13		**GLOW-PLUGS PRE-HEAT INDICATOR (YELLOW)** When lit, the glow-plugs pre-heat is on; the engine can be started when the indicator turns off.
14		**ENGINE COOLING LIQUID TEMPERATURE INDICATOR (RED)** When lit during the engine operation, it indicates high cooling liquid temperature; the control system stops the engine after 5 seconds from switch-on
15		**ENGINE OIL PRESSURE INDICATOR (RED)** When lit during the engine operation, it indicates low engine oil pressure; the control system stops the engine after 5 seconds from switch-on.
16		**CHARGE STATUS INDICATOR (RED)** When lit, it indicates the malfunction of the alternator.

Tab. 5-1B

5.2 INSTRUMENTS ON THE MACHINE

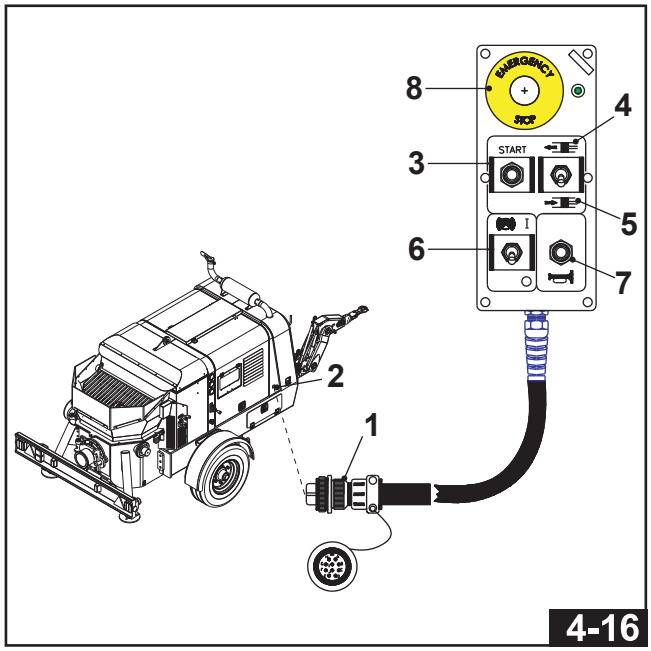


1			**PUMPING PRESSURE GAUGE** It indicates the hydraulic pressure of the pumping circuit.
2			**S VALVE PRESSURE GAUGE** It indicates the hydraulic pressure of the S valve circuit.
3			**SERVICES CIRCUIT PRESSURE GAUGE** It indicates the hydraulic pressure of the agitator, of the high pressure washer and of the hopper discharge.
4			**HYDRAULIC OIL TEMPERATURE / LEVEL INDICATOR** It indicates the level and temperature of the hydraulic oil contained in the tank.
5			**ACCELERATOR LEVER** Pushing the lever down increases the engine's speed. Pushing the lever up decreases the engine's speed.
6			**OUTPUT REGULATION LEVER** Turning the knob adjusts the concrete flow rate.
7			**AGITATOR REVERSAL / DRIVE LEVER** Stable position. Drive: In this position the agitation of the material in the hopper is activated. Stable position. Reversal: In this position the agitation reversal of the material in the hopper is activated.
8			**HIGH PRESSURE WASHER LEVER** Stable position. Activating the lever activates the high pressure washer.
9			**HOPPER DISCHARGE LEVER** Unstable position. Activating and holding the lever opens/closes the hopper discharge shutter.
10		-	**BATTERY CUT-OFF SWITCH** It is positioned inside the engine compartment, near the battery. It disconnects the power supply. Turn the knob clockwise to feed the electrical system. Turn the knob anti-clockwise and pull out to disconnect the electrical system from the battery. With knob extracted, insert the cap to protect the internal contacts of the device.
11		-	**REMOTE CONTROL SOCKET CAP** It is located on the left part on the fixed bodywork, before the controls side door. It must always be inserted on the socket in order for the machine to work. It contains an electric circuit for the machine emergency circuit.

Tab. 5-2

5.3 REMOTE CONTROL

The machine is equipped with a remote control via cable;
- Insert the plug 1 (FIG.4-16) in the connector's socket 2 (FIG.4-16) located on the machine's bodywork.
- Enable the remote control from the machine’s control board by means of stable selector 7 (FIG.5-1).
- Press START button 3 (FIG.4-16) to enable the functions of the remote control via cable.
- Place the selector at 4 (FIG.4-16) to enable pumping (stable command).
- Place the selector at 5 (FIG.4-16) to reverse pumping (stable command). The selector’s neutral position blocks pumping.
- Place selector 6 (FIG.4-16) at 1 to enable the vibrator, at 0 to disable it (stable command).
- Press button 7 (FIG.4-16) to make sound signals.
- Press button 8 (FIG.4-16) to stop the endothermic engine in emergency.



Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.4.

5.4 PROCESSING PHASES

MACHINE SWITCH-ON

Carry out the necessary daily checks described in § 6.1.

The engine air inlets must be free.

Check that the hopper grid is closed.

The pumping and mixing selectors must be in neutral position.

Check that the emergency button 1 (FIG.5-1) is not engaged.
Follow the engine ignition phase as shown in table 5-1A:
- Key insertion
- First click: General power supply
- Second click: Glow-plugs pre-heat
- Third click: Engine start
- Press button 3 (FIG.5-1) to enable the board controls.

If the engine does not start after 10 seconds from first attempt, wait at least 40 seconds and try again.

Do not repeatedly and insistently start (not more than 15 seconds), the starter motor may brake.

For low temperature start-ups, refer to the Engine use and maintenance manual.

LUBRICATION OF GROUT PIPES

Package an adequate amount of grout (water and cement):
• pumping up to 20 m - 40/50 litres
• pumping beyond 20 m - 50/80 litres
- Pour the grout in the hopper.
- Activate the agitator by placing lever 7 (FIG.5-2), hopper side, in stable position (Anti-clockwise rotation).

During the heating phase, do not use the machine at maximum load. Heat the oil by running the machine for about 10 minutes (depends on ambient temperature).

- Using the manual accelerator 5 (FIG.5-2), progressively accelerate the engine up to bottom ramp and activate pumping by using the selector 4 (FIG.5-1).

Press the selector switch 5 downwards to suck the mix (FIG.5-1): the mix is sucked by piping and re-introduced in the hopper. To return to the pumping phase, press the selector switch upwards.

- Rotate the hydraulic pump adjustment lever 6 (FIG.5-2) to obtain minimum flow rate.

If the "safety intervention" indicator 10 switches on (FIG.5-1), it means the hopper safety grid is open and the grid safety device has intervened: hydraulic supply is interrupted and the controls are disabled.
In this case, close the grid and re-enable the control by pressing button 3 (FIG.5-1).

CONCRETE PUMPING

Ensure material outflow does not create dangers in the unload area before starting pumping.

- When the pumping barrels' inlets and/or wear plate surface from the hopper full of grout, pour the concrete in hopper and activate the electric vibrator by means of selector 6 (FIG.5-1), then start pumping at low flow rate.
- Flow rate can be increased to wanted value using the flow rate adjusting lever, when the first concrete reaches the piping line's outfeed.

During the first few pumping cycles the operator must check the pressure on the pressure gauge 1 (FIG.5-2) that indicates that the operating pressure of the hydraulic cylinders does not exceed too high values.
Excessive pressures are indicative of potential clogging.
The effective work pressure (on hydraulic circuit oil) varies based on used mix and layout of the piping line.
During the S valve exchange phase, pressure gauge 2 (FIG.5-2) indicates the operating pressure of the hydraulic jacks (controlling the S valve).
The auxiliary circuit pressure gauge 3 (FIG.5-2) indicates the services' work pressure (agitator, material discharge shutter, high pressure washer), that must be below 180 bar.
Should only the agitator be operating and the pressure gauge shows 180 bar pressure, it means that the agitator rotation is blocked.
Check the cause and unlock it by acting on lever 7 (FIG.5-2) to reverse its rotation.

REMOTE CONTROLS

Insert the plug into the connector's socket located on the machine's bodywork 11 (FIG:5-2), if using the remote control via cable (see par.4.3.3).
If machine is provided with radio control, connect the receiver to the connector's socket.
The LOCAL/REMOTE selector switch 7 (FIG.5-1) allows selecting the pumping controls from the control board (local) or from a remote device [comando a distanza (di serie) o radiocomando (optional)].

5.5 EMERGENCY STOP

In case of danger, stop the machine by pressing the emergency button.

Press the button to stop the machine. Press and turn the button clockwise (as shown on the button) to disarm it.

5.6 NORMAL MACHINE STOP

Before stopping the engine, run it idle and empty for at least 5 minutes; this decreases the operating temperature. Always perform this operation, unless a dangerous situation occurs requiring an emergency stop.

5.7 REFUELLING

Use approved containers. Do not use buckets, bottles, jars, etc..

Do not smoke or generate open flames or sparks in the work area.

Do not mix petrol or alcohol with diesel fuel. The mixture can cause fires and serious damage to the engine.

Open cap 1 and fill the tank (Fig. 5-3). Only use the type of lubricant shown in the technical data in § 2.1.

5.8 WHAT TO DO IN CASE OF CLOGGING

The most dangerous situation during pumping is the clogging of the conveying pipe. In this condition the mortar pump pressure gauge indicates pressures higher than those of normal operation and the mortar no longer flows from the pipe.

5.8.1 Clogging of the conveying pipe

The operator must be specifically trained to following the operations below. Ensure there is no residue pressure in the piping and no other persons are near-by, before opning a joint. This, potentially dangerous, operation must always be carried out, with the utmost caution, by an experienced person.

The manometer 1 (FIG.5-2) shows pressure higher than 300 bar and pumping blocks in case of clogging.
Reverse pumping cycle and run 4-8 suction cycles: the hopper content level will increase.
Clogging can now be eliminated.

The critical points are normally in correspondence of the fittings.

Steel pipes clogging
- The obstruction is located by the noise emitted upon impact of the iron hammer against the pipe:
a metallic sound is heard if the pipe is not clogged, whereas a plonking sound is heard if the pipe is clogged.
- Disconnect the clogged pipe from the piping line, once this has been pre-emptively depressurised.
- Place the pipe vertically to evacuate its contents.

Rubber hoses clogging
- The pipe is hard and rigid near the obstruction; on the contrary, the hose sags upon treading.
- Disconnect the clogged hose from the piping line, once this has been pre-emptively depressurised.
- Place the hose vertically (backing over the shoulder) to evacuate its contents (FIG. 5-3A).

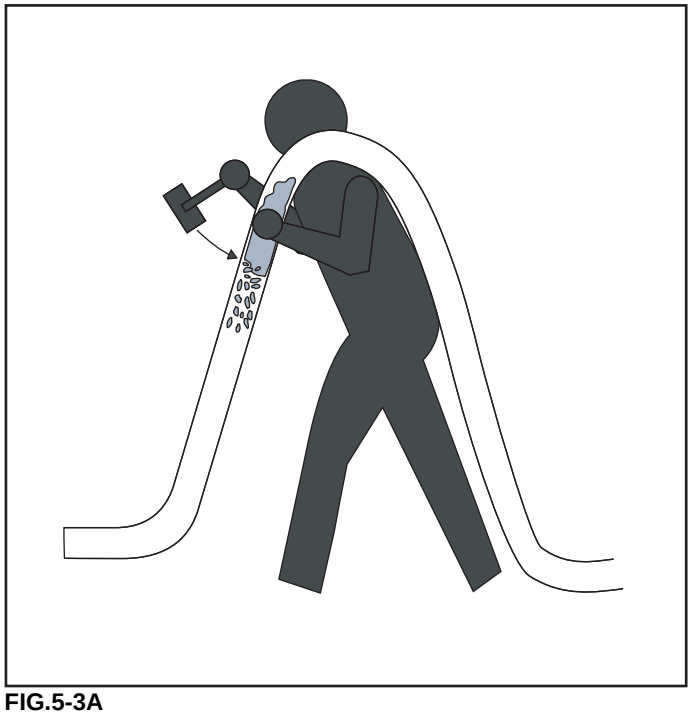


FIG.5-3A

If the clogging cause is a mixture that cannot be pumped, it must be evacuated from the hopper.

5.9 HIGH WASHER PRESSURE (OPTIONAL)

If the machine is equipped with high pressure washer, it must be used to clean the machine after use.

Only use clean water and observe the limits of use indicated in § 2.1.

Do not use the high pressure washer without water supply.

Do not use damaged pipes or water guns.

Do not point the water gun towards yourself, other people, animals or objects.

The fittings must be properly tightened.

Do not use the high pressure washer in case it has suffered strong impacts, there are evident oil leaks or water leaks. In this case the high pressure washer must be checked by an authorised maintenance technician.

Ensure there is no ice inside the pump if using at extremely low temperatures.

Firmly grasp the water gun and pay attention to the reaction force of the water jet.

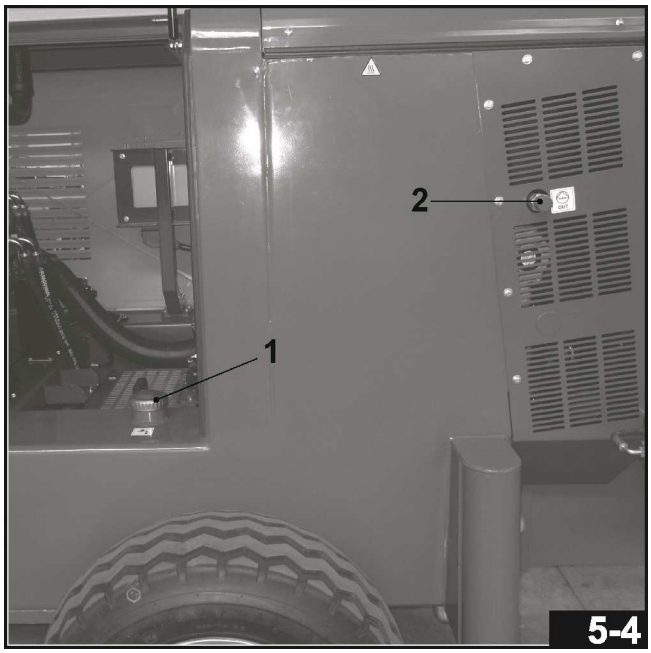
Do not direct the jet towards materials containing health damaging substances.

Do not modify or tamper with the high pressure washer.

Prevent the crushing or damaging of suction and delivery pipes.

The high pressure washer fears frost. Always drain the residual water from the system.

Perform the checks provided by the routine maintenance; contact a qualified technician for extraordinary maintenance.



Fill the tank by unscrewing the cap 1 with clean water (PIC.5-4).
Connect the high pressure delivery pipe to the fitting 2 (FIG.5-4).

5.10 CLEANING THE MACHINE

The operator must be specifically trained to perform the following operations. Ensure there is no residue pressure inside the piping and no other persons are near-by, before opening a joint. This, potentially dangerous, operation must always be carried out, with the utmost caution, by an experienced person.

Only authorised persons can work inside the dangerous area. No one else can stand near the machine.

- Stop the mixer, pumping, and electric vibrator once last mix is pumped.
- Reverse pumping. Make a few reverse pumping to depressurise the piping line, particularly near the delivery manifold.
- Stop the engine.

All the cleaning and discharching operations must be done with engine switched off.

- Release the bend on the delivery manifold.
- Open the bottom flap below the hopper and unload the residue material.
- Using a water jet, wash inside the hopper.
- Close the bottom flap.

Before start enging and concrete pumping, make sure that all safety devices are fully functional.

- Start engine.
- Insert a maximum of 15-20 cm the water pipe inside the delivery manifold.
- Activate reverse pumping.
- Stop the engine.

- Open the bottom flap and discharge the hopper.
- Continue for some cycles until only clear water comes out from the hopper.

- Cover the hopper and S valve walls with oil or other lubricant: in this way the mix inside the hopper has less possibilities of forming deposits upon subsequent work session.
- We recomend covering the hopper with a tarpaulin to avoid foreign bodies falling inside it.
- Check there are no concrete residues inside the barrels, hopper, S valve and delivery manifold.

The non-pumped or unloaded from hopper residue material, must be disposed according to current laws.

To prevent damage, do not strike the material exhaust manifold with the hammer.

Sponge ejection may be violent. Safely lock the end part of the conveying pipe. Do not point the pipe towards yourself, other people, animals or objects.

Also drain the residual water from the water system. Leave the valves open to discharge the water and protect the system in case of low temperatures.

After cleaning, turn off the machine. Place the mortar pump selector and mixer in neutral position. Turn the key to 0 and remove it. Close the control door again. Open the bonnet and disconnect the battery cut-off switch. Close the bonnet with the side locks again.

For long periods of inactivity, we recommend removing the battery and keep it charged.

6 - MAINTENANCE

Observe the safety requirements in chapter 3.

Only use original spare parts.

6.1 ROUTINE MAINTENANCE

Remember that routine maintenance is the user's responsibility. Refer to the Engine manual for the engine routine maintenance.

		WHEN NECESSARY	DAILY	EVERY 50 HOURS OR EVERY WEEK	EVERY 200 HOURS OR MONTHLY	EVERY 400 HOURS OR 6 MONTHS	EVERY 500 HOURS OR 1 YEAR	EVERY 1000 HOURS OR 24 MONTHS
Engine air filter cartridge check	§ 6.1.1 Man. Engine		X					
Engine air filter cartridge replacement	§ 6.1.1 Man. Engine						X	
Compressor oil level check (OPTIONAL)	Man. Compress.		X					
Compressor oil replacement (OPTIONAL)	Man. Compress.						X	
Hydraulic oil level check	§ 6.1.2		X					
Engine oil level check	§ 6.1.3 Man. Engine		X					
Fittings and material conveying pipe check	§ 6.1.4		X					
Conveying pipe anchor check	§ 6.1.5		X					
Machine and accessories cleanliness	§ 5.10		X					
Greasing	§ 6.1.6		X					
Tightening clamps and fuel pipes check	Man. Engine				X			
Engine air intake pipe	Man. Engine				X			
Hydraulic system fittings and pipes check	§ 6.1.9				X			
Battery replacement	§ 6.1.10							X
Water system intake filter check	§ 5.9				X			

[1]First inspection from a minimum of 20 km to a maximum of 100 km, then every 6 months of 1500 km.

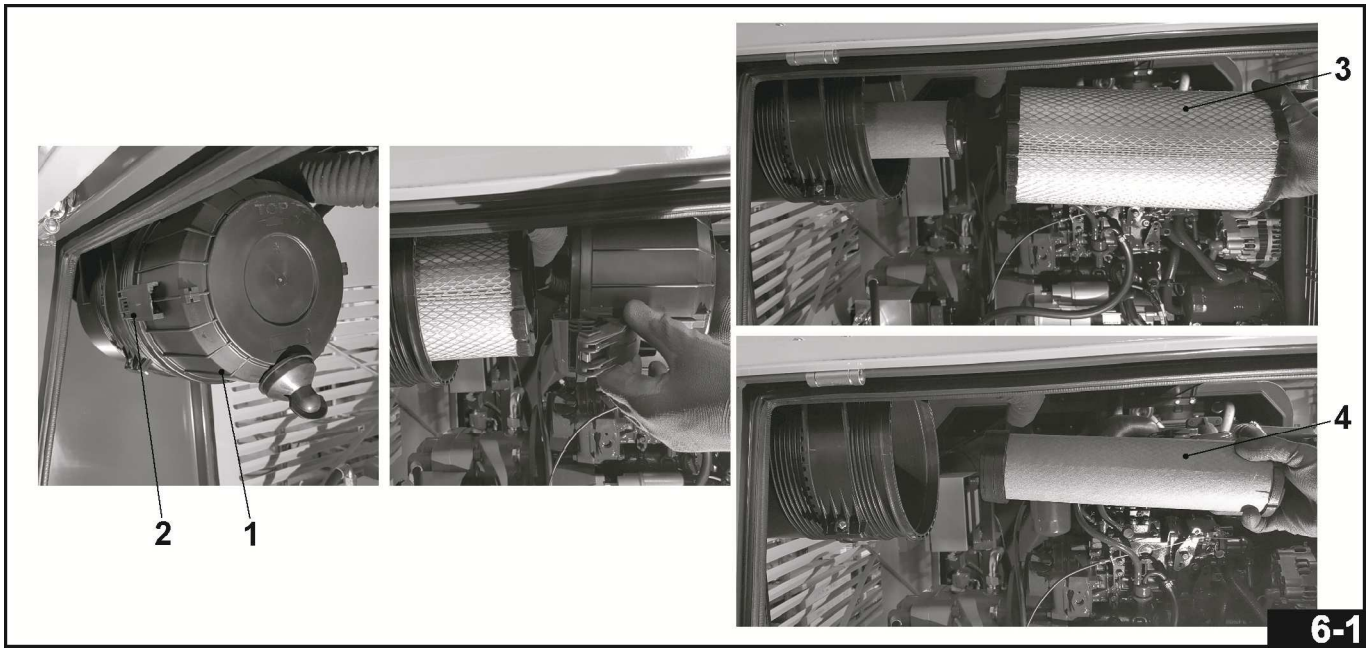
[2] Halve the maintenance intervals if the trailer is subject to winter journeys or exposed to salty environment.

Tab. 6-1

6.1.1 Check and replacement of the engine air filter

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

Remove lid 1 by opening flaps 2 (PIC.6-1).



ALWAYS REFER TO THE ENGINE'S USE AND MAINTENANCE MANUAL.

The filter is composed of two cartridges, the outer one 3 (first stage) and the inner one 4 (second stage). Manually pull out the first stage cartridge; pull out the second stage cartridge.

The first stage cartridge must be cleaned by gently and repeatedly hitting on a hard surface, never washed or exposed to compressed air flow.
The second stage cartridge can some times be cleaned with compressed air, never washed.
Also clean the container and lid.

ATTENTION:
The compressed air pressure must not exceed 5 bar and the air jet must be kept at about 150 mm from the cartridge surface.

OILY OR WET CLOGGING:
- Replace the cartridge.

VISUAL CARTRIDGE INSPECTION:
- Check the sealing surfaces of the cartridge for damage.
- Hold the cartridge against the light or pass a bulb inside it to see if t he paper is slit or damaged.

Insert the second stage cartridge, engaging it on the relative support of the container.
Introduce the first stage cartridge and close the lid again with the flaps.

Replace the cartridges observing the frequencies indicated in Tab. 6-1.

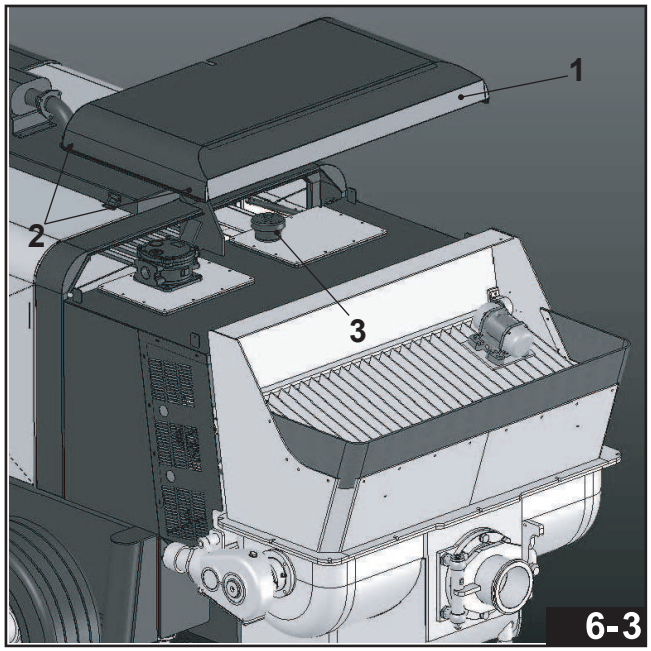
6.1.2 Hydraulic oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None
	Top-up	No.10 wrench and funnel

The oil level in the tank must be half-way on the level indicator 1 (Fig.6-2).

To top-up remove lid 1 by loosening screws 2 and cap 3 (Fig. 6-3) and fill up to half-way on the level indicator. Help yourself with a clean funnel to prevent fluid leaks. Only use the type of oil reported in § 2.1.

Do not mix different oils as they can damage the hydraulic system components.

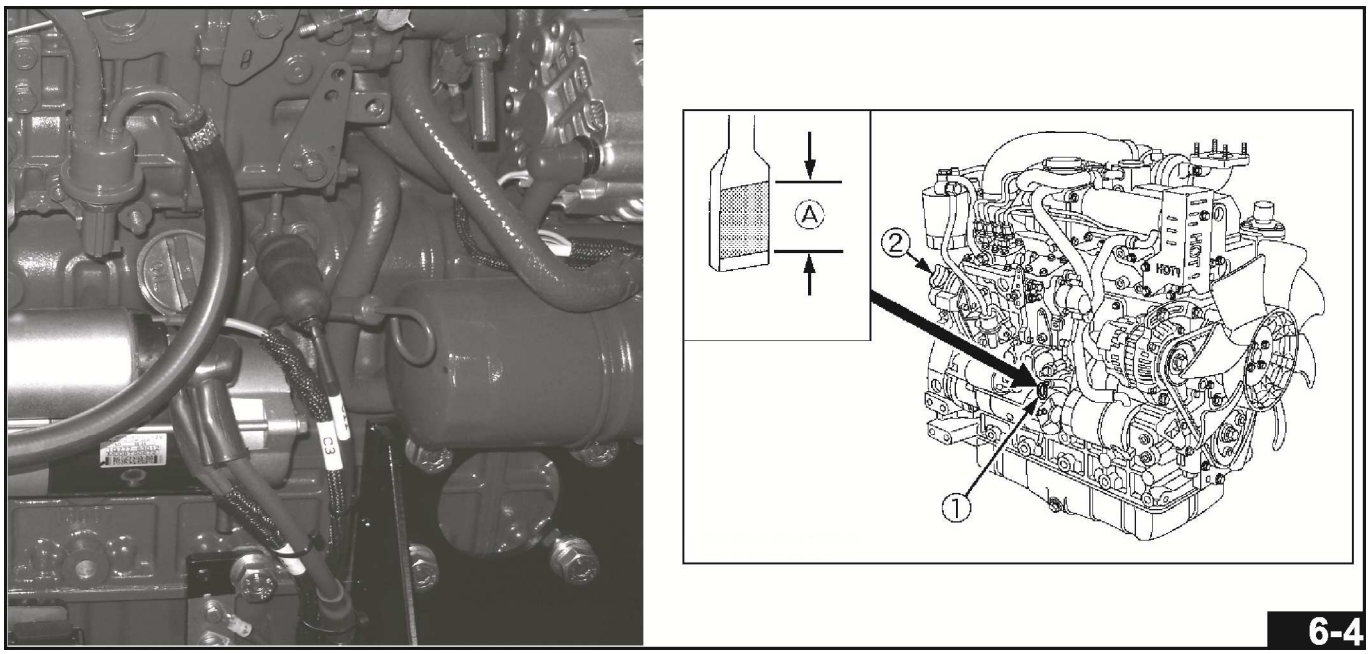


If after a few consecutive checks the oil level is significantly reduced, it is possible that the system leaks. If the leak comes from a loose fitting, tighten the fitting; if the leak comes from a pipe, have it replaced with a new and original pipe, by an authorised maintenance technician. If you cannot find the source of the leak, contact the Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance to resolve the fault.

6.1.3 Engine oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

Remove rod 1 (Fig. 6-4), clean the end in contact with the oil using a clean cloth, put the dipstick back in and pull it out again; the amount of oil must be between the minimum and the maximum. To top-up, remove the dipstick and add oil through the same inlet up to the prescribed level. Help yourself with a clean funnel to prevent fluid leaks. After adding the oil, wait 5 minutes and check the level again. This time is necessary for the oil to reach the oil pan.



ALWAYS REFER TO THE ENGINE'S USE AND MAINTENANCE MANUAL.

Only use the type of oil reported in § 2.1. Do not mix different oils as they can damage the engine.

If after a few consecutive checks the oil level is significantly reduced, it is possible that the engine is not working properly. Contact the Dealer, the TURBOSOL PRODUZIONE S.P.A. technical assistance or an authorised workshop directly.

6.1.4 Fittings and material conveying pipe check

When	When beginning work	
Pipe state	Clean, disconnected from the machine	
Tools	Visual inspection	None

The conveying pipe could be composed of a iron hose or rubber hose, to the ends of which the fittings are crimped (permanently). The fitting contains a indipendent removable sealing gasket.
Visually check the good condition of the conveying pipe, fittings and gaskets. The outer surface of the rubber hose must not be cut or cracked; also, the rubber near the fittings must be intact, both internally and externally. The fittings must not be deformed. The gaskets must not be cut or deformed.

If the piping is damaged or you are not sure of its good condition, replace it with a new and original one.

If the gaskets are damaged or you are not sure of their good condition, replace them with new and original ones.

6.1.5 Conveying pipe anchor check

When	When beginning work	
Anchor state	Clean, not released from the conveying pipes	
Tools	Visual inspection	None

Check the good condition of the anchors: the metal parts must not be damaged or rusty.

If the anchors are damaged or you are not sure of their good condition, replace them with new and original ones.

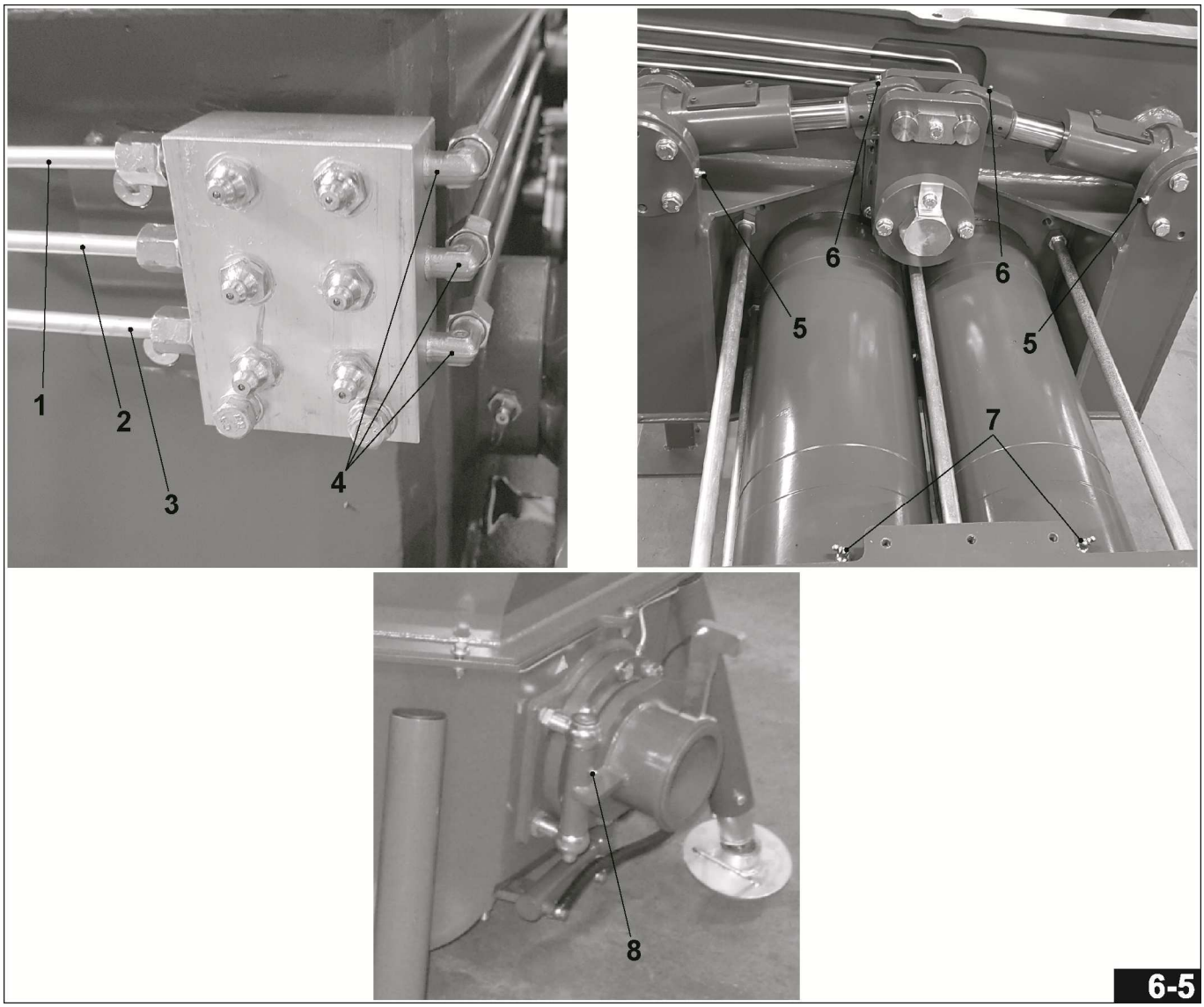
6.1.6 Greasing

When	At end of work
Machine state	With machine off
Tools	Grease pump supplied (usable grease indicated in § 2.1)

Grease through the lubricators on the machine (Fig. 6-5).

1 Reducer side agitator support
2 S-valve outfeed flange support
3 Blind side agitator support
4 Exchange jacks lever and S-valve support
5 Exchange jacks tilting support
6 Exchange jacks joints
7 Pumping barrels
8 Delivery flange opening joint (if present)

For the lubrication of the pumping barrels, it is necessary to bring the rubber piston to start and then step 7. Repeat the operation with the second rubber piston.



6-5

If the agitator supports and the S valve are properly greased, the grease must flow out from the gaskets inside the hopper.

6.1.7 Hydraulic system fittings and pipes check

When	When beginning work	
Machine state	With machine off	
Tools	Visual inspection	None
	Tightening	Various wrenches

The pipes must always be in good conditions. They must not be cut or cracked. The fittings and the locking system must be intact. Do not use pipes of dubious condition. Tighten the fittings if you notice leaks.

6.1.8 Battery replacement

When	As needed
Machine state	With machine off and cold
Tools	No.13 wrench to fix the battery
	No.10 wrench for the battery poles

Check that the battery cut-off switch is disconnected.

Disconnect the negative pole (-) 1, the positive pole (+) 2 and disassemble the battery stop 3 (Fig. 6-8). Replace the battery with a new and original one or with one having features not inferior to those indicated in the technical data. Reassemble the stop, reconnect the positive pole (+) and the negative pole (-).

6.1.9 Replacing lubrication water

- Open the cock to empty the bowl 1 (FIG. 6-9).
- Check the bowl's water content: the presence of fine suspended material is normal.
- Close cock once the bowl is empty.
- Fill the bowl by pouring water through the slits until it overflows.
- Check the level and purity even during work.

Anti-freeze can be used with cold weather. Respect the safety sheets of the chosen anti-freeze during use and the laws in force with regard to the disposal of such substances.

We recommend emptying the bowl each working day. Water in the bowl must be changed when showing fine sediments.

6.1.10 PUMPING PISTONS REPLACEMENT

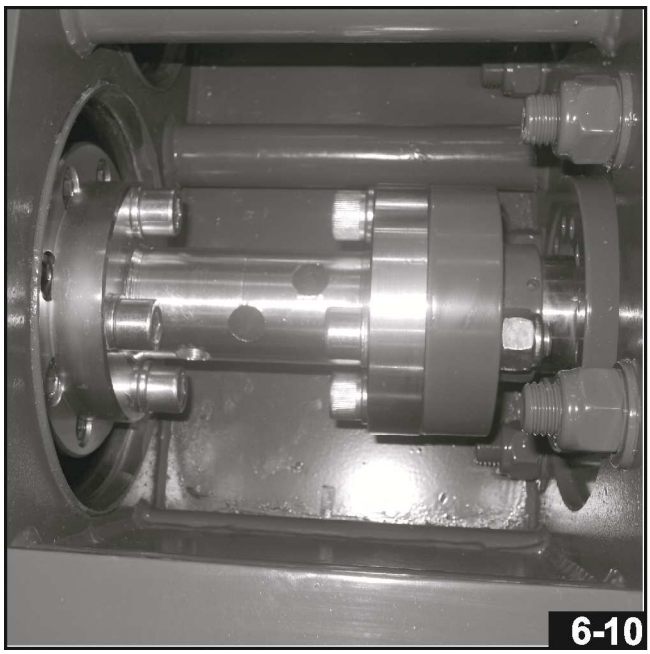
When in the cooling bowl sand grains or pebbles appear and not just cement, immediately replace all pistons.

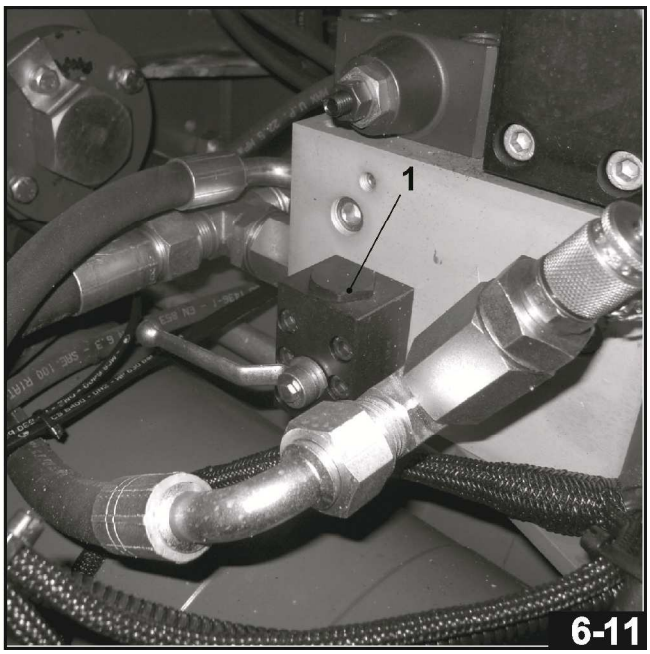
As repeatedly described herein, before performing any manual operation on the pumping unit or cooling bowl, the diesel engine must be switched off. Therefore, turn off the engine and place the electric control board ignition key in your pocket.

However, when performing these operations:

- do not use the radio control or remote control, which must be disconnected from the machine- do not allow anyone to approach the machine or the control board during the piston replacement. If someone approaches the machine, the aintenance operations must be immediately interrupted.

REMOVE THE PUSHING PISTONS
- Drain the water from the cooling bowl through the valve at the side of the machine
- Remove the protections above the bowl by removing the mechanical block (fixing screw)
- Turn on the machine, place the flow rate regulator at minimum
- Activate the pumping system until one of the two pistons reaches stroke end, so as to clearly see the spacer fitting in the centre of the bowl (Fig. 6-10).
- Turn off the machine from the main board and put the key in your pocket (operation to be performed whenever you are about to manually work on the pumping unit or on the cooling bowl).
- Open the discharge valve 1 of the hydraulic accumulator (Fig. 6-11 in closed position):
  Open valve (discharge - maintenance phase)
  Closed valve (work phase).


6-10



6-11

OPERATIONS TO BE PERFORMED AS SHOWN IN FIGURE 6-12.

Using a 14 Allen key, a 24 fixed key and a large screwdriver or iron strip unlock the 4 screws fixing the spacer fitting on the hydraulic stem or pumping piston.

Hydraulic stem side:
Place a large screwdriver or iron strip in one of the spacer fitting holes to lock it in place, then loosen two of the 4 fixing screws using the Allen key
The other two screws must be loosened with Allen key and fixed key, the screwdriver can be fixed against the water bowl side as shown in figure.

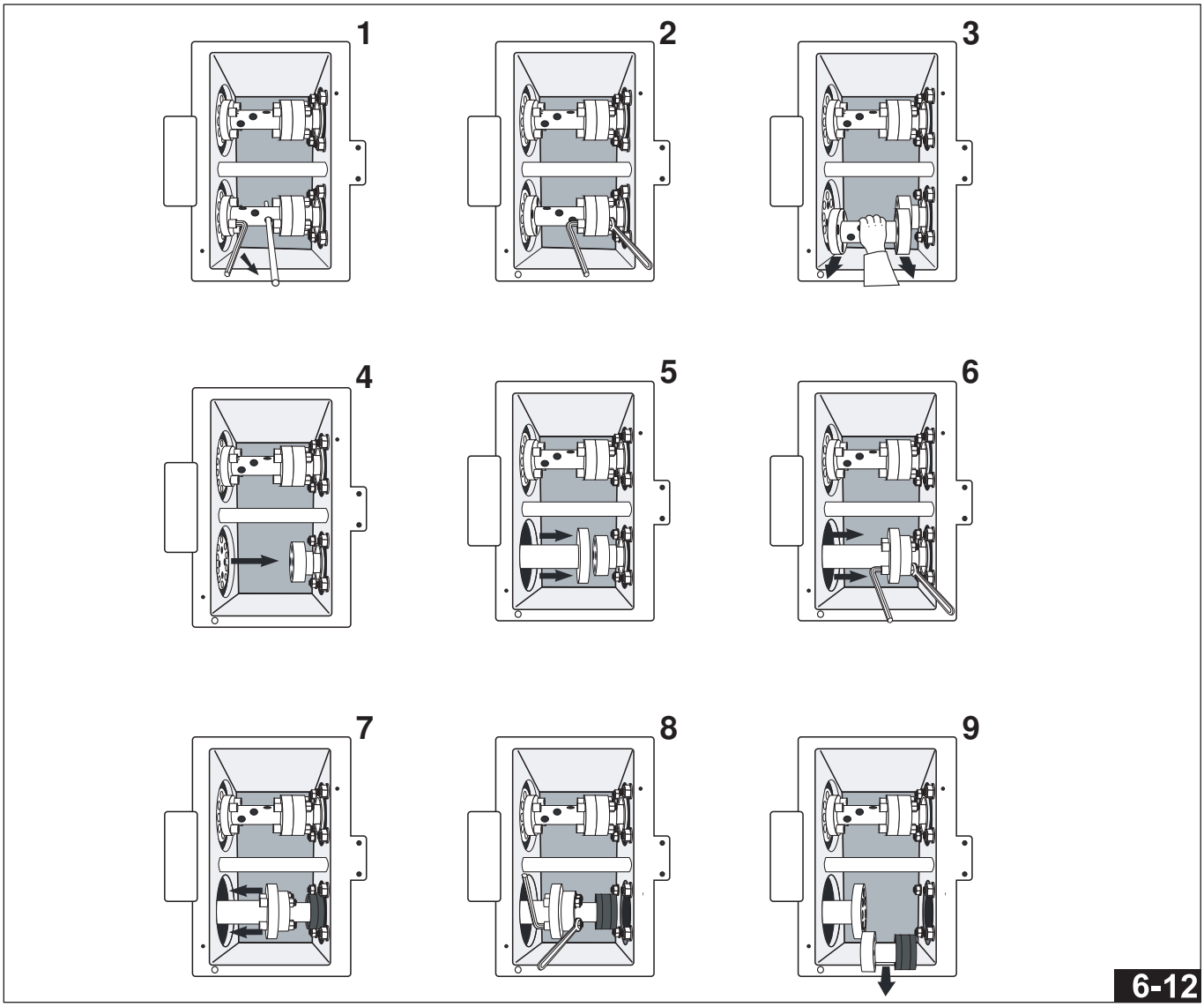
Pumping piston side:

Using the Allen key unloosen the four screws fixing the spacer fitting to the piston, always with the help of a large screwdriver to lock the fitting.

Spacer fitting removal:
Remove the spacer fitting by manually extracting it from the bowl, if still locked use a hammer.

Worn piston removal:
Extract the piston from the cylinder by possibly tightening half of the screws in the piston support for extra grip.

Inserting the new piston:
Distribute grease to lubricate the pistons: it is good practice to put more grease, the excess will disappear during installation.
Place the piston in front of the pumping barrel and insert it slowly, if necessary use a small hammer.
With the piston inserted, insert the spacer fittings and tighten the screws and bolts.
Always connect the spacer fitting to the piston and only then to the hydraulic piston stem.
When the operation is completed, turn on the machine again, slowly perform an exchange and repeat the same operations for the replacement of the right side piston.
To do this, close the accumulator discharge valve, with valve open the machine may not exchange.

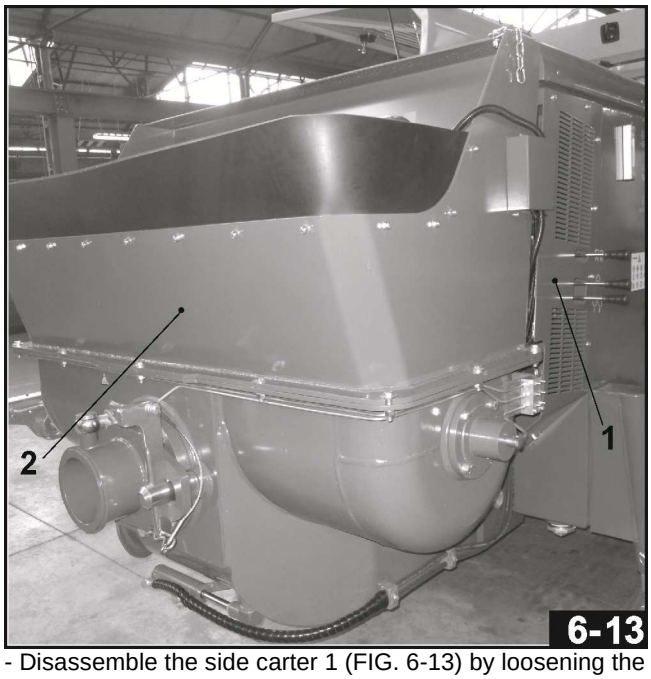


6.1.11 WEAR PLATE, WEAR DISC AND S-VALVE ADJUSTMENT REPLACEMENT

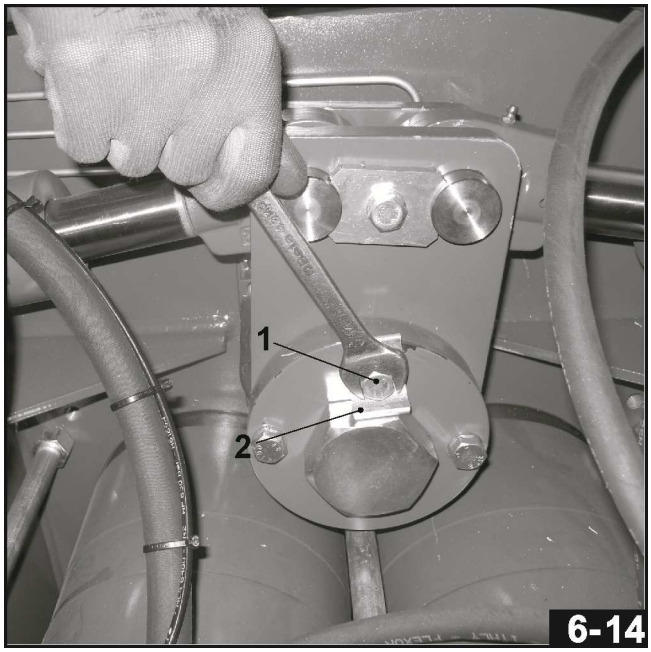
The following operations must be performed with machine turned off.

Open the accumulator discharge valve to remove pressure from the circuit (as indicated in paragraph 6.1.12 FIG. 6-11)

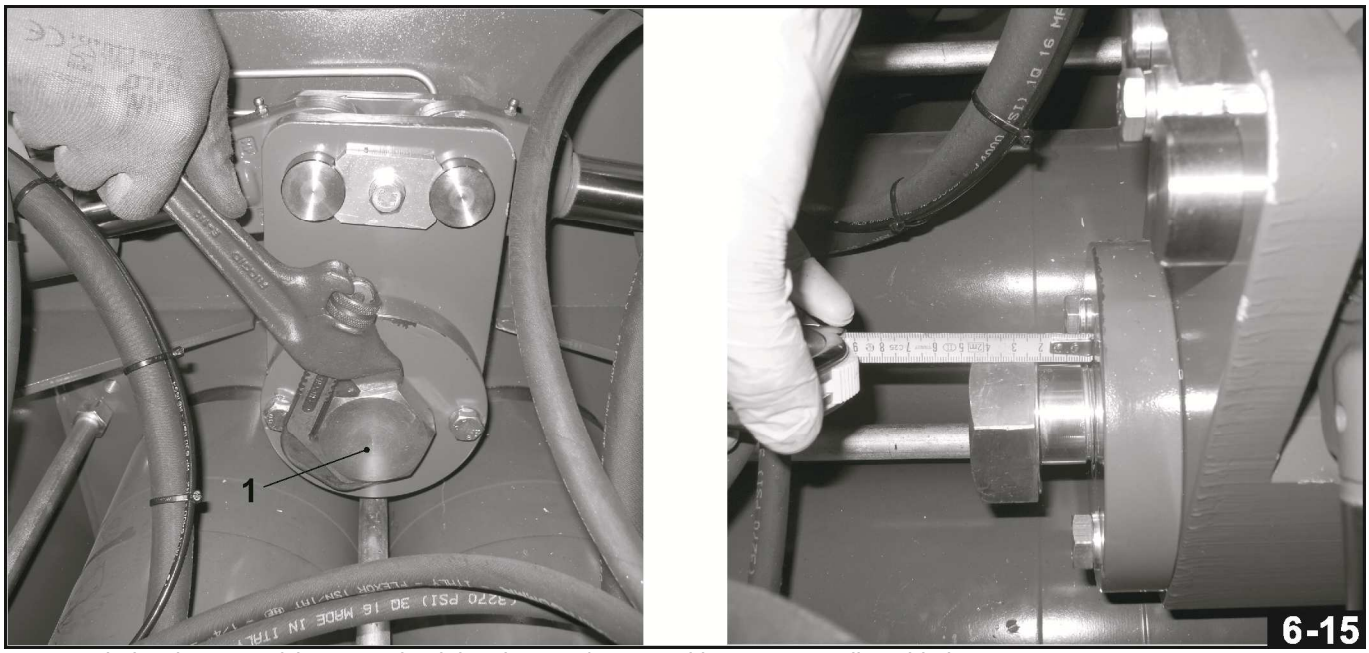
WEAR DISC REPLACEMENT



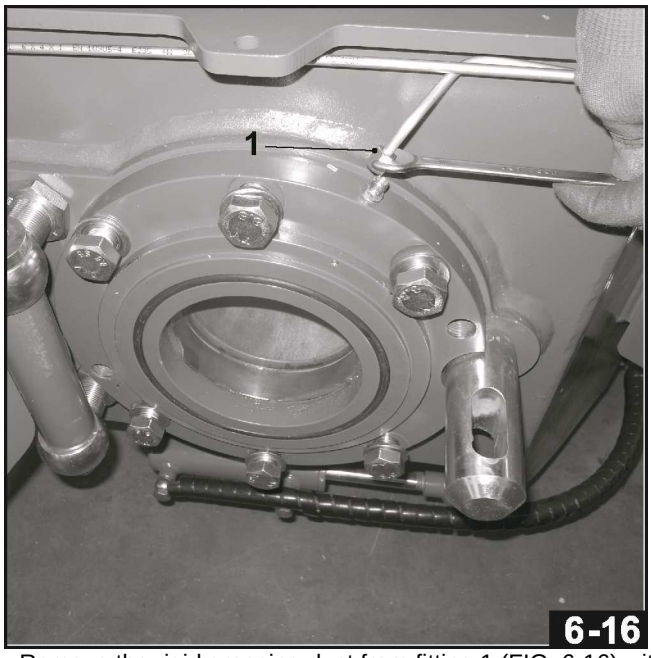
- Disassemble the side carter 1 (FIG. 6-13) by loosening the bolts with a 10 mm key.
- Disassemble the upper hopper 2 (FIG. 6-13) by loosening the six bolts with a 19 mm key.



- Remove the anti-rotation lock bracket 2 (FIG. 6-14) by loosening bolt 1 (FIG. 6-14) with 17 mm key.



- Loosen bolt 1 (FIG. 6-15) by extracting it by about 15/20 mm with 65 mm or adjustable key.

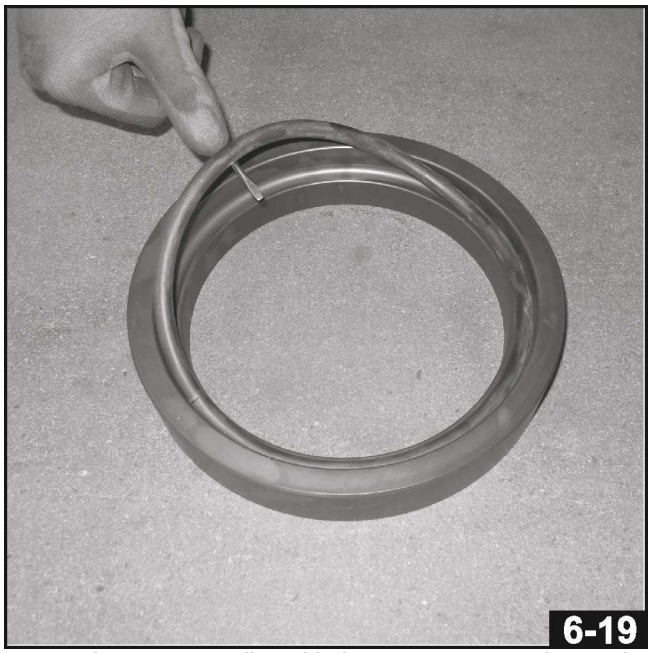


- Remove the rigid greasing duct from fitting 1 (FIG. 6-16) with 12 mm key.

- Loosen the delivery flange by about 15/20 mm by loosening the six bolts with 30 mm key and making leverage on the S valve using a piece of wood (FIG. 6-17).

Attention! Do not remove the flange completely.

- Extract the wear disc to be replaced (FIG. 6-18).



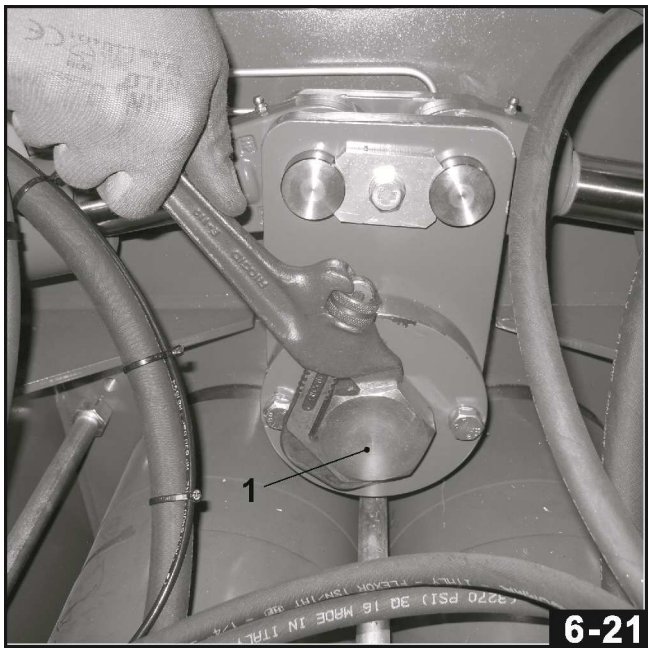
- Insert the new wear disc with the new compensation gasket (FIG. 6-19).

WEAR PLATE REPLACEMENT

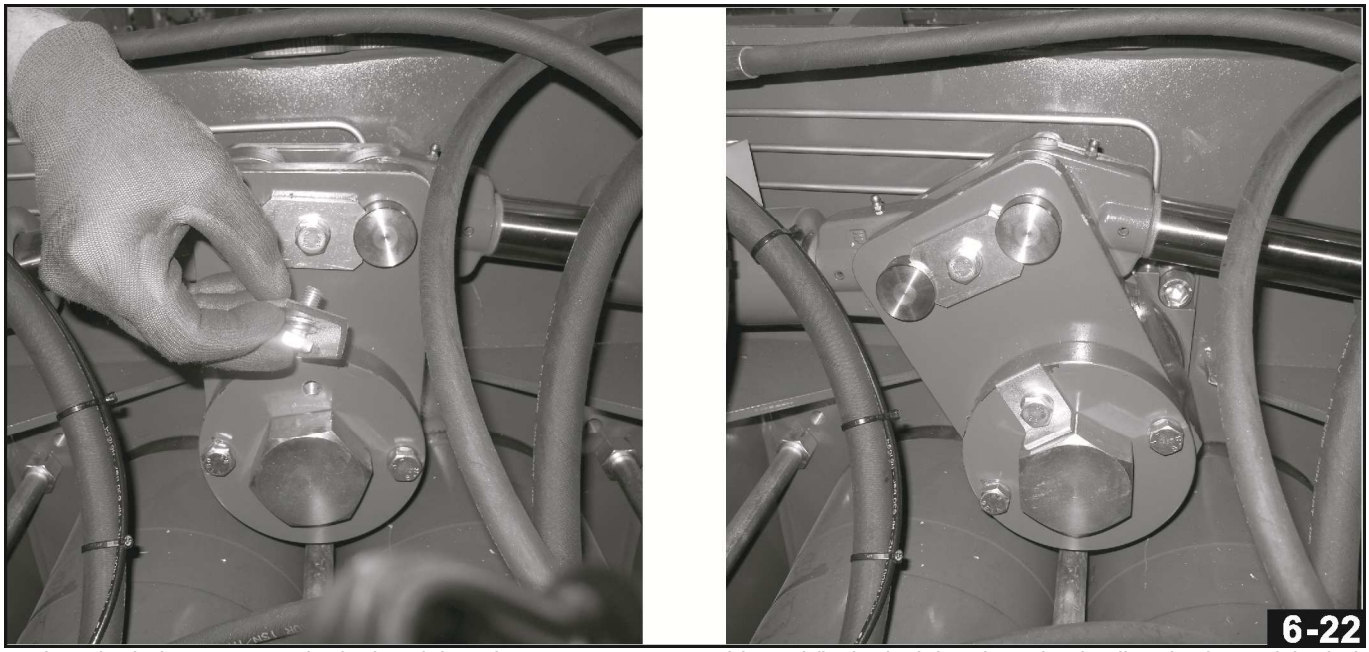
- Disassemble the wear plate by loosening the three bolts using 24 mm key (FIG. 6-20)
- Replace the wear plate with a new one and fix it with the three bolts.

S VALVE ADJUSTMENT

The S valve is adjusted to eliminate play between the wear plate and wear disc and restore seal between them. This play is due to wear caused by friction of the two stated components.
Water leaks between the disc and the plate, during washing and material outflowing between the same components, and during pumping, show the non-perfect seal.
S valve adjustment is indicatively carried out where distance between wear plate and disc exceeds 0.25 mm or if the S valve is repeatedly clogged.



- Tighten the S valve adjustment bolt 1 (FIG. 6-21) with 65 mm or adjustable key.



- When the bolt starts to resist further tighten by 60°-120°, reassemble and fix the lock bracket, simply align the front of the bolt near the bracket itself (FIG. 6-22).

- Fix the delivery flange 1 (FIG. 6-23) by tightening the six bolts with 30 mm key.
- Reconnect the rigid duct for greasing 2 (FIG. 6-23) to the fitting on the delivery flange.
- Start the machine and check the S valve regularly exchanges, with the engine at minimum.

6.2 PREPARING THE MACHINE FOR LONG PERIODS OF INACTIVITY

PREPARING THE MACHINE FOR LONG PERIODS OF INACTIVITY
The following precautions must be taken if the machine is not to be used for a long period:
- pull the pistons back towards the cooling bowl one at a time and proceed to grease through appropriate lubricators.
- fill the hydraulic tank up to the hydraulic filter base
- empty the fuel tank
- disconnect the battery
- grease the machine through the lubricators and/or centralised greasing system and separately grease the S valve, wear disc/plate.

RESTART AFTER LONG PERIODS OF INACTIVITY
The following precautions must be taken when the machine is put back into operation after a long period of inactivity:
- drain the condensate from the hydraulic tank
- check the hydraulic oil level
- visually inspect the entire machine.
- insert fuel and connect the battery
- grease all machine lubrication points.
- turn on the diesel engine and run it at low RPM until the suitable fluid temperature is reached.

6.3 EXTRAORDINARY MAINTENANCE

The machine extraordinary maintenance must be carried out by the maintenance technician. The extraordinary maintenance of the engine must be performed by personnel authorised by the engine manufacturer.

	WHEN NECESSARY	EVERY 200 HOURS OR MONTHLY	EVERY 400 HOURS OR 6 MONTHS	EVERY 500 HOURS OR 1 YEAR	EVERY 1000 HOURS OR 24 MONTHS	EVERY 1500 HOURS
Engine oil	◊			♦		
Engine oil filter cartridge	◊			♦		
Fuel filter cartridge	◊			♦		
Hydraulic oil	◊				♦	
Hydraulic oil filter	◊				♦	
Air filter	◊	■		♦		
Filler cap and oil tank vent	◊	●			♦	
Engine	◊				●	●
Engine supports	◊					
Hydraulic system	◊			●		
Safety system elements	◊	●				
Trailer	◊[1]			●[2]		
Engine air intake pipe					♦	
Fuel pipes and tightening clamps					♦	
Oil tank breather cap				♦		
Electrical system				●		
Battery electrolyte		●				
Battery terminals		●■				
Battery charge status		●				
Material conveyor fittings and pipes		●				
Machine structure				●		
Fan			●			
Radiator		■				
Fuel tank		■				
General machine check				●		

Description of the symbols				
◊ Service before 50 hours of operation	● Filling Check Restore	■ Cleaning	◘ Greasing	♦ Replacement

[1] After 6 months or 1500 km
[2] Every year or 10000 km

Tab. 6-3

7 - DEMOLITION

Observe the safety requirements in chapter 3.

The operations to be performed are those for the scrapping of:
- steel, copper, aluminium parts (metal alloys in general);
- rubber and plastic compounds;
- insulating materials;
- lubricating materials;
- batteries and their fluids;
- etc.

The machine demolition and disposal must be carried out according to law.

8 - TROUBLESHOOTING

This chapter sets out the common problems that can arise and the possible solutions.

Contact your Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance if the problem cannot be resolved or for different anomalies from those listed below.

For any engine-related problems, consult the Engine manual or directly contact an authorised workshop.

FAULT	POSSIBLE CAUSE	SOLUTION
The control board does not switch on	Battery switch disconnected / faulty fuse	Insert the battery switch / check the fuses
	Flat or faulty battery	Check the battery charge state
	Oxidised or loose battery cable clamps	Clean or tighten them
	Fault in control board	Contact the Technical Assistance
The engine does not start	Emergency button pressed	Release the emergency button after ascertaining that the machine can safely resume work
	Flat or faulty battery	Check the battery charge state
	Oxidised or loose battery cable clamps	Clean or tighten them
	No fuel	Fill the tank with fuel
	Air in the fuel pipe	Locate the infiltration by thoroughly checking all pipes
	Faulty starter motor	Request assistance by the engine manufacturer
	Faulty injectors	
	Faulty fuel solenoid valve	
	Faulty injection pump	
	Alternator is not charging the battery and the battery indicator (on the control board) is on	Check the tension and conditions of the alternator belt, replace if necessary
	Faulty temperature probes	The relative indicator in the control panel lights up. The control board temperature indicators with efficient probes must turn off
	Faulty engine oil pressure switch	Replace the pressure switch. The control board temperature indicators with efficient pressure switch must turn off
The engine tends to turn off.	Clogged diesel oil filters	Replace the diesel oil filters
	Diesel oil tank in reserve	Add diesel oil
	Clogged air filter	Clean or replace the air filter
The pumping does not work	Open hopper grid	Close the grid
	Emergency button pressed (in this case the engine turns off)	Release the emergency button after ascertaining that the machine can safely resume work
	Clogging along the concrete pipe (the hydraulic oil pressure is constantly at maximum values)	Remove the clogging by operating safely. Check that the concrete has the necessary features to be pumped
	Foreign body between the S-valve and the wear plate (the hydraulic oil pressure is constantly at maximum values)	Place the machine in reverse for 1÷3 seconds to clear the S-valve's operating space. If this procedure is not sufficient, manually remove the foreign body by operating safely
	Broken wear plate (the hydraulic oil pressure is constantly at maximum values)	Replace the wear plate
	Electric circuit failure	Request intervention of the Turbosol Technical Assistance
The mixer does not turn	Open hopper grid	Close the grid
	Foreign body in the hopper	Turn the machine off. Open the hopper grid and remove the foreign body
	Mixing shaft seizure for failed greasing	Grease and observe if this resolves the problem, otherwise consult the spare parts catalogue to replace the mixing shaft gaskets
The high pressure washer does not generate flow rate	Mixer working	Deactivate the mixer
	Jammed hydraulic motor	Deactivate and reactivate the high pressure washer. If after a few tests the problem persists, contact the Turbosol Technical Assistance
	Clogged use (e.g. obstructed nozzle)	Restore use
Irregular high pressure washer flow rate and pressure (buttons)	Air suctioned	Check the integrity of the intake circuit
	Dirty water inlet filter	Clean the filter
	Clogged use (e.g. clogged nozzle)	Restore use
Accentuated high pressure washer noise	Intake circuit with chokes	Check intake circuit
	Excessive supply water temperature	Feed the pump with water below 50°C