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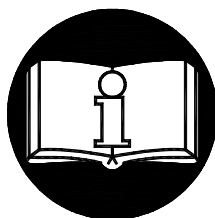
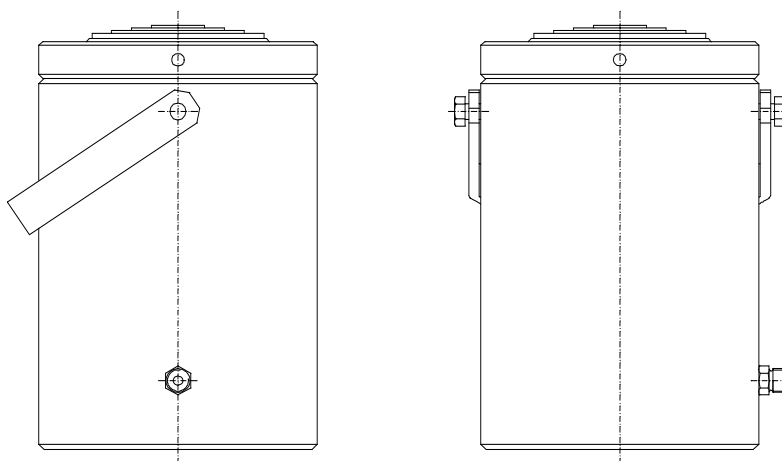
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SAFETY PRINCIPLES, OPERATION AND MAINTENANCE MANUAL FOR

HYDRAULIC CYLINDER

type Z321

lifting capacity 25t; 50t; 100t and 200t



Read this manual carefully before using this product. The manual contains important safety, installation, operation and maintenance instruction. Make this manual available to all responsible persons.

Keep for further use!

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1 DEFINITION

! DANGER

Danger: indicates the presence of a hazard, which will cause death or severe injury if the warning is ignored.

! WARNING

Warning: indicates the presence of a hazard, which can cause death or severe injury if the warning is ignored.

! CAUTION

Caution: indicates the presence of a hazard, which can cause minor injury if the warning is ignored. Caution can also indicate dangerous practices.


Lifting capacity (Q): indicates maximum mass of load (working load limit) the cylinder is designed to support in general service under conditions given by this manual.

2 INTENDED PURPOSE


2.1 Hydraulic cylinder type Z321, lifting capacity 25t; 50t; 100t and 200t (further only cylinder) is designed solely for lifting and lowering free loads of big weight in vertical direction by the help of manual pump at normal atmospheric condition on a workplace. Weight of load during lifting must not exceed nominal lifting capacity.

2.2 Design of the cylinder meets requirements given by Directive of European Parliament and Council 2006/42/EC as amended by the Czech technical regulation – Government regulation no. 176/2008 Collection of law as amended and requirements of harmonized Czech technical standards ČSN EN ISO 12100 and ČSN EN 1494+A1.

2.3 Výrobek svým provedením vyhovuje požadavkům stanoveným Směrnicí Evropského parlamentu a Rady 2014/34/EU ve znění českého technického předpisu – nařízení vlády č. 116/2016 Sb. v platném znění. Výrobek je proveden jako zařízení

 **IM2c** dle ČSN EN 13463-1:2009 a ČSN EN 13463-5:2012. Splňuje podmínky pro použití v důlním prostředí „nebezpečné atmosférické podmínky 2“ dle ČSN EN 1127-2.

2.4 Výrobek svým provedením vyhovuje požadavkům stanoveným Směrnicí Evropského parlamentu a Rady 2014/34/EU ve znění českého technického předpisu – nařízení vlády č. 116/2016 Sb. v platném znění. Výrobek je proveden jako zařízení

 **II2GDcT85°C** dle ČSN EN 13463-1:2009 a ČSN EN 13463-5:2012. Splňuje podmínky pro použití v prostředí „zóna 1 a zóna 21“, „zóna 2 a zóna 22“ dle ČSN EN 1127-1.

Note: Articles 2.3 and 2.4 are valid for type of construction of hydraulic cylinder for explosive environment.

3 SAFETY PRINCIPLES

3.1 SAFETY SUMMARY

Danger exists particularly when the cylinder is not used properly or is poorly maintained. Since an accident or serious injury could result, special safety precautions apply to the operation with the hydraulic cylinder during its use, maintenance and inspection.

! WARNING

NEVER work under lifted load or close to it.

NEVER lift more than lifting capacity shown on cylinder.

ALWAYS make sure the ground is firm enough to support safely fully loaded cylinder and all lifting operation.

ALWAYS keep sufficient spacing from the load.

ALWAYS let people around to know when lift is about to begin.

ALWAYS read the operation manual and safety instructions.

Remember proper rigging and lifting techniques are the responsibility of the operator. Check all applicable national directions, regulations and standards for further information about the safe use of your hydraulic cylinder.

3.2. SAFETY PRINCIPLES

! WARNING

3.2.1 Before use

ALWAYS ensure physically strong, qualified and instructed persons elder 18 years of age, knowing this manual and trained in safety conditions and way of work operate the cylinder.

ALWAYS check the cylinder every day, prior starting the work according to the article 8.2.(1) „Daily inspection“.

ALWAYS make sure the lift is sufficient for intended operation.

ALWAYS ensure load against unwanted motion.

ALWAYS make sure the cylinder stands on firm ground.

ALWAYS make sure the cylinder stands vertically.

ALWAYS use recommended pumps and connection houses only.

NEVER use damaged or worn cylinder.

NEVER use cylinder without visible marking of the lifting capacity on it.

NEVER use a cylinder marked by the label „**OUT OF SERVICE**“.

ALWAYS consult use of the cylinder in non-standard or extreme conditions with manufacturer or the authorised representative.

3.2.2 While operation

ALWAYS make sure the load is properly placed on a cylinder.

ALWAYS pay attention not to exceed maximum height of lift marked by the red groove on a piston.

ALWAYS after lifting a load ensure the piston of the cylinder by the nut.

ALWAYS underlay load, if you intend to work on it.

ALWAYS pay a special attention to a cylinder, if piston is released to maximum position

(marked by the red groove on a piston).

NEVER use cylinder for permanent underlying of loads.

NEVER allow the load, causes impacts or vibrations.

3.2.3 After use

NEVER leave lifted load without attendance and without ensuring the piston against self downturn by the nut.

3.2.4 Risk analysis

The analysis of possible risk in turn of design, operation and environment of the hydraulic cylinder application is mentioned in freestanding document "Risk analysis". This document can be required in service centres.

3.2.5 Maintenance

ALWAYS let qualified personnel inspect the cylinder regularly.

Only such interventions can be done when maintaining that are in compliance with requirements of the manufacturer specified in the chapter 13 of this manual.

It is not allowed to provide repairs and maintenance in a different way then specified by the manufacturer. It is especially prohibition of use of no original parts or providing changes of product without the agreement of manufacturer.

4 PACKING, STORAGE AND MANIPULATION

4.1 PACKING

4.1.1 Cylinders are supplied assembled with hydraulic liquid, free loaded in transport cases.

4.1.2 The following accompanying documentation is a part of the delivery:

- a) Operation manual
- b) EC Declaration of conformity
- c) Certificates of Quality and Completeness and Guarantee Card
 - c1) Guarantee period is stated in the Guarantee Card.
 - c2) The guarantee does not apply to defects caused by infringement of the instructions stated in this Operation Manual and defects occurred owing to improper use and unskilled intervention.
 - c3) The guarantee does not apply also to any modifications on the product without a written approval of the manufacturer.
 - c4) Claim of product defects is carried out according to applicable provisions of commercial code eventually as amended.

4.2 STORAGE

Store jacks in dry and clean stocks free of chemical influences and vapors.

- (1) Remove from jack all dust, water and impurities.
- (2) Push piston into the initial (lowered) position.
- (3) Store the cylinder so as the piston was in vertical position.
- (4) During further use follow instructions of the article 8.1.4 „Occasionally used jack“.

4.3 MANIPULATION

Follow the valid technical regulation and standards and standards for work with heavy loads.

The hydraulic jack is not portable by women and persons under 18 years of age.

5 MAIN TECHNICAL PARAMETERS

Type	Lifting capacity (t)	Lift (mm)	Operating pressure (MPa)	Swept volume (l)	Range of working temperature	Connecting screw (mm)	Weight (kg)
Z321	25	145	65	0,56	-10 °C to +50 °C	M18 x 1,5	20
	50	145		1,4			40
	100	145		2,23			87
	200	145		4,55			190

5.1 DATA ON PRODUCT

Every product is fitted with a label with specified data as follows:

Standard design:	Design for explosive environment:
Manufacture's identification	Manufacture's identification
Address of the manufacturer	Address of the manufacturer
Type of product	Type of product
Pressure	Pressure
Serial number	Serial number
Year of production	Year of production
CE marking	CE marking
	Symbol of protection type (<i>IM2c</i> for group I , <i>II2GDcT85°C</i> for group II)

5.2. MATERIAL AND DESIGN

5.1.1 All parts are made of steel.

5.1.2. There are no materials inclinable to spark ignition used in construction of the cylinder by course of amendment no. 2 article 1.3.1 of Government regulation no. 116/2016 Collection of law and harmonized technical standards ČSN EN 1127-2 article 6.4.4, ČSN EN 1127-1 article 6.4.4 and ČSN EN 13 463-1 article 8.1.

5.1.3. Materials with dangerous effects of static electricity in terms of ČSN EN 1127-2 article 6.4.7, ČSN EN 1127-1 article 6.4.7, ČSN EN 13463-1 article 7.4.3 and ČSN 33 2030 are not used in cylinder.

5.1.4 Plastics (high pressure hoses, pressure liquids) used in operation of cylinder in explosive environment according to the article 2.3 and 2.4 of this manual must meet ČSN EN 1127-2 article 6.4.7, ČSN EN 1127 – 1article 6.4.7, ČSN EN 13463-1 article 7.4.3, ČSN 33 20 30 and for use in mining environment § 185 paragraph (1) Czech mining office no. 22/89 Collection of law as amended.

6 OPERATION OF CYLINDER

Before installation carefully check the cylinder, whether is not damaged.

Cylinder is supplied without the oil charge.

6.1 CHECKING BEFORE THE INSTALLATION

6.1.1 Support face

! WARNING

ALWAYS make sure the support face is firm enough to support assumed load for the whole time of manipulation. Installation must not be carried out on the surface we cannot check the loading capacity or is unstable

ALWAYS the user is responsible for positioning the cylinder!

NEVER allow the weight of the load or total piston thrust exceeds nominal lifting capacity.

6.2 CONNECTION OF CYLINDER WITH PUMP

Cylinders are determined for use in connection with manual hydraulic pump type HP03L, HP05L or HP07L. Pump association depends on swept volume of cylinder. Recommended association of pump to cylinder describes the following tablet:

Capacity of cylinder (t)	Number of connecting cylinders (pcs)	Association of pump - type	Swept volume (l)
25	1	HP 03L	0,56
	2	HP 05L	
50	1	HP 03L	1,4
	2	HP 05L, HP 07L	
100	1	HP 03L	2,23
	2	HP 05L, HP 07L	
200	1	HP 05L, HP 07L	4,55

Cylinders are connected with pump by the help of high pressure hoses of type 4SP DKOS/DKOS about inner diameter 6mm. Hoses are supplied as the separate product in basic length 2m or in other length to 6m according to wish of the customer. Hoses is fitted on both ends with screw M18 x 1,5mm.

! CAUTION

During use of long hoses connection between pump and hydraulic cylinder is necessary **ALWAYS** judge individually, whether amount of oil in houses do not limit use of hydraulic cylinder lift.

Note: 10m of hose of inner diameter 6mm represent cca 0,3l oil.

6.3 POSITION OF CYLINDER DURING LIFTING OR LOWERING

During lifting or lowering of load the bottom of cylinder shall sit on firm a large enough so as to avoid sinking of the cylinder. Pay attention the cylinder stand vertically. Axes of piston can be diverted at max. about 3°.

! WARNING

ALWAYS make sure the jack stands vertically during lifting.

6.4 LIFTING A LOAD

Before lifting a load make sure the piston nut is not screwed up to prevent its full insertion into the cylinder. Piston shall be in its initial (lower) position.

Lifting is provided by the oscillatory motion of the hand lever of the pump. Instructions for operating the pump are stated in separate manual that is delivered to each pump. After finishing the lifting ensure piston against self-dropping by the nut - see fig. 6.5.

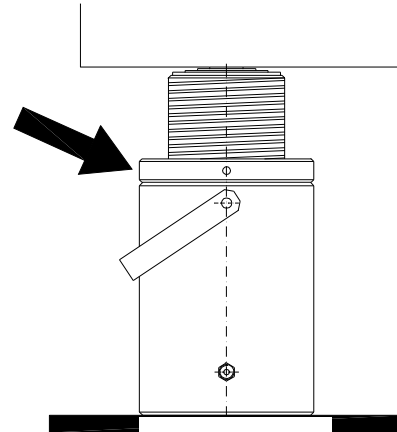


Fig. 6.5

! WARNING

ALWAYS before lifting make sure, the piston matrix does not prevent its full insertion into the cylinder.

ALWAYS pay attention during lifting so as not exceed maximum height of lift.

NEVER lift piston of cylinder over red marked groove, which is under screw of piston!!

ALWAYS ensure the piston by the matrix after termination of lifting.

6.5 LOWERING A LOAD

Before lowering a piston, at first slightly lift up the piston by several pendulum motions of the hand lever and then unscrew the piston matrix to its top position.

Lowering the piston and speed of lowering control by releasing the screw of the drain valve thanks to slide on hand lever. Before lowering the piston in dusty environment we recommend to clean up the surface of the piston.

6.6 TEST BEFORE THE USE

! CAUTION

- (1) Visually check the cylinder and support area, whether they are without defects.
- (2) At first, look again at the previous articles of this manual and make sure that all steps were done correctly and cylinder is correctly connected with appropriate pump.
- (3) By the move of pump lever check the function of the cylinder without a load.
- (4) Provide several lifting and lowering with a suitable load (10% up to 50% capacity).
- (5) At the same time check the cylinder and pump, whether at interruption keep load without a drop of piston.
- (6) Check, whether there is no outflow of oil due to the leakage.

7 OPERATION

7.1 USE OF THE CYLINDER

Cylinder is intended for vertical lifting and lowering of heavy loads under normal condition on workplace. It is operated by the help of separately delivered pump and connecting hoses. Can be used by organisations as well as the private persons.

As work with heavy loads can pose unexpected danger, it is necessary to follow all "Safety principles" according to the chapter 3.

7.2 SAFETY WORKING ENVIRONMENT

! WARNING

- (1) The operating staff of the hydraulic cylinder must be demonstrably familiarized with this operation manual, must observe applicable safety and hygienic regulations and must be qualified for operation of this equipment.
- (2) The operating staff should be equipped with protective footwear and gloves for work with the jack.
- (3) When operating by more persons ALWAYS there must be determined one worker trained with safety of work responsible for manipulation with the cylinder.
- (4) The operating staff must have a clear and unobstructed view of the whole working area before starting the work. When it is not possible, one or more persons must help to supervise in the nearby area of the hydraulic cylinder.
- (5) The operating staff must check, whether the entire work place is safe and whether there is as possibility of escaping from this area in case of endanger, before starting to operate the cylinder.
- (6) During the work with the cylinder the suitable distance of the operating staff from the load must be kept. It is prohibited to lift or lower bulky loads preventing to keep sufficient safety distance.

8 INSPECTION OF CYLINDER

8.1 INSPECTION

8.1.1 Inspection classifications

(1) Initial inspection: precedes first use. All new or repaired hydraulic cylinders shall be inspected by a responsible qualified person to ensure the qualified fulfillment of requirements of this operation manual.

(2) Inspection procedures of hydraulic cylinders operated regularly are generally divided into two classifications based on the intervals at which should be performed. The intervals depend on the condition of the critical components of the hydraulic cylinders and the degree of the wear and tear, deterioration or malfunction. The two general classifications are herein classed as daily and regular ones. The respective intervals are defined as follows:

(a) Daily inspection: visual inspection, carried by the operator, designated by the user on the beginning of each use.

(b) Regular inspection: visual inspection carried out by the qualified person designated by the user.

1) normal operation – once per year,

2) heavy operation – twice per year

3) special or infrequent operation – according to the recommendation of the qualified person at first usage and according to the directions of the qualified person (workers of maintenance).

8.1.2 Daily inspection

Regarding parts such as those recommended in the section 8.2(1) „Daily inspection“ verify, whether the girder clamp is without any defect. Provide this inspection also during operation in the interval between regular inspections. Qualified employees will determine whether any defect or damage can constitute a hazard and whether more detailed inspection is necessary.

8.1.3 Regular inspection

Complete inspections of the hydraulic jack perform as recommended regular inspections. These inspections may be performed with the hydraulic jack in its normal location. Recommended regular inspection specified in the section 8.2(2) shall be performed under the supervision of qualified persons that will determine, whether it is necessary to repair the girder clamp. These inspections shall include the requirements of the daily inspection as well.

8.1.4 Occasionally used hydraulic cylinder

(1) Hydraulic cylinder, which has been idle for a period of one month or longer but less than one year, remit to the inspection conforming to the requirements of the section 8.1.2 before follow-up putting it into operation.

(2) The hydraulic cylinder, which has been idle for a period of one year, remit to the inspection conforming to the requirements of the section 8.1.3 before follow-up putting it into operation.

8.1.5 Inspection record

Always keep the record of the performed tests, repairs, inspections and maintenance of the girder clamp. Dated inspection records perform in time intervals specified in the section 8.1.1 (2) (b) and such records store in an accessible place designated by the user.

Defects discovered by the inspection or reported during work must be announced to person responsible for safety designated by the user.

8.2 INSPECTION PROCEDURE

(1) Daily inspection (carried out by the operation start or a qualified person)

PART	INSPECTION METHOD	LIMIT/CRITERIA FOR DISCARDING	REMEDY
1. Function of the cylinder	By testing.	Slow or no movement of piston during lifting.	Exchange of piston cup. ----- <i>Note: This defect can be caused by the failure of the pump – see manual for pump.</i>
2. Check of piston matrix.	By screwing.	Matrix cannot be screwed up.	Clean the tread of matrix and piston and lubricate.
3. Connection with a pump.	Visually.	Oil leakage in the place of thread.	Tighten nut of hose or repair.

(2) Regular inspection (carried out by the qualified person)

PART	INSPECTION METHOD	LIMIT/CRITERIA FOR DISCARDING	REMEDY
1. Piston	Visual check	Oil leakage around the piston	Exchange of piston cup (see art. 10.3)
2. Screwing	Visual check	Oil leakage	Tighten screwing or repair
3. Label – marking of capacity on cylinder	Visual check	Illegible lifting capacity	Repair or exchange by the new one
4. All parts	Visual check	Worn or damaged parts Polluted parts	Replace by new part. Dismantle, clean up and assemble again

9 TROUBLESHOOTING

Possible malfunctions can be caused by the pump. Since pump is integral part of the lifting complete we state the possible malfunctions caused by the pump.

SITUATION	TROUBLE CAUSE	REMEDY
1. During lifting the piston moves very slowly or it does not move at all. Drop of piston caused by the load does not occur.	Leakage of pump inlet valve or forcing valve of pump or piston cup of pump.	Leakage caused by impurities you can try to remove by flushing of pump e.g. quick pendulum movement of hand lever. If the leakage appears henceforth, dismantle valves and clean up carefully. Exchange the rubber piston cup (see art. 10.3)
	Struck piston.	Complete repair necessary.
2. After finishing of lifting self-acting drop of piston occur.	Leakage of drain valve.	Tighten drain valve. If the fault lasts, dismantle valve and clean up.

10 MAINTENANCE

10.1 SAFETY PRINCIPLES

! WARNING

Maintenance can be carried out only by qualified persons trained in safety and maintenance of these cylinders.

ALWAYS use only original parts supplied by the manufacturer.

It is not permitted to perform repairs and maintenance the other way then prescribed by the manufacturer. It concerns especially the forbiddance of using unoriginal parts or carrying out modifications on the product without any approval of the manufacturer.

ALWAYS check the function of the cylinder after maintenance.

ALWAYS mark the defective or repaired jack by the suitable label (for example: „**OUT OF OPERATION**“).

NEVER start maintenance, when a load is on the cylinder.

NEVER work with a jack, which is under repair!

NEVER use cleaning liquids on acid base.

10.2 GENERAL INSTRUCTION

The following instructions give general important information about dismantling, inspection, repair and assembly. If the hydraulic jack was dismantled from any reason, proceed according to the following instructions:

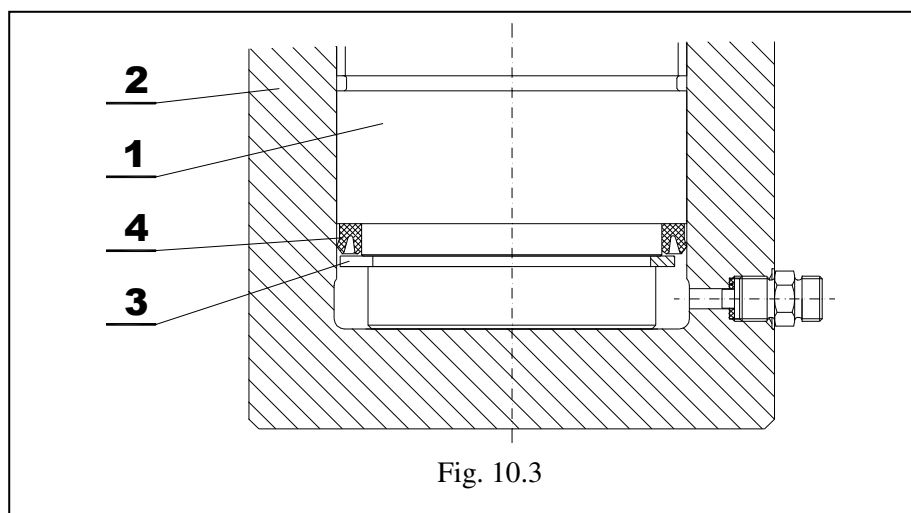
1. Provide maintenance in a clean environment.
2. **NEVER** dismantle jack more than it is necessary for providing a repair.
3. **NEVER** use excessive force during dismantling parts.
4. **NEVER** use heat as a means during dismantling parts, if these parts are determined for further use.
5. Keep the workplace clean and without foreign substances that could get onto piston bearing surface or into the inner mechanism of the jack.
6. If the part is gripped in a vice, **ALWAYS** use suitable material (leather, copper, piece of wood, etc.) to protect surface of parts.

10.3 EXCHANGE OF PISTON CUP (DISMANTLING OF PISTON) - fig. 10.3

1. Drain all oil of the cylinder and disconnect cylinder from the pump.
2. Take out the piston (1) from cylinder (2) together with the piston nut.
3. Remove safety ring (3), and pull out the piston cup (4).
4. After exchange of the cup (4) provide assembly in an opposite sequence.

Pay attention, the piston cup was not damaged during putting the piston into the cylinder.

Pay attention the piston was utterly clean.



10.4 CHECK

Check all dismantled parts, whether they are suitable for further use.

1. Check all parts, if they are not worn out or do not have scratches or cracks.
2. Check, whether the thread parts does not have damaged thread.
3. Check especially piston cup.

10.5 REPAIR

Worn out or damaged parts shall be replaced. Small surface burns and scratches or other small surface defects remove and smooth by the fine abrasive stone or the abrasive cloth.

10.6 TEST

The load test shall be carried out at all repaired cylinders:

A load not exceeding nominal lifting capacity is applied to a cylinder. Piston moved up about 10 mm and in this rest position is remained at minimum 3 minutes (without locking of the piston by the nut). Then the load is lowered into origin position.

At this test the correct function of the pump, hydraulic cylinder, high pressure hose and discharge valve is checked. Lifting and lowering must be fluent, jamming and seizure must not occur. During 3 minutes of steady load must not occur an apparent drop of piston and to oil leakage around piston cup or other sealing.

11 REMOVING FROM OPERATION – LIQUIDATION

Before removing the jack from the operation remove all oil and rinse cylinder by the degreasing agent (benzine, etc.).

Thus treated jack give you can give to a firm dealing with liquidation of metal scrap.

Piston cup give over to the liquidation of plastic.

Drained oil pass over to an authorised and professional firm dealing with petroleum waste category SR (special risk) or give it directly to garbage disposal plant having authorisation to combustion of such a waste.

12 RELATED DOCUMENTATION

EC declaration of conformity

Instruction manual was elaborated in accordance with the following technical regulations, technical standards and national regulations:

- Government regulation no.176/2008 Collection of law as amended (Directive of European Parliament and Council 2006/42/EC)
- ČSN EN ISO 12100
- ČSN EN 1494+A1

13 FINAL REQUIREMENTS OF THE MANUFACTURER TO A CUSTOMER

Any changes of the product, eventually use of unoriginal spare parts can be realised only based on approval of the manufacturer.

When not observing this condition the manufacturer does not guarantee safety of this product. In such a case the manufacturer warranty does not apply to the product.