

RATAJ[®]

SHAFTLESS SCREW CONVEYORS

Instructions for Use of the Conveyor

**The conveyor's operator must thoroughly study these
Instructions for Use.**

valid for types:

RL, RLN, RLP, RRL, RLE, RLNE, RRN

Name:	SHAFTLESS SCREW CONVEYOR
Type:	RL, RLE, RLH, RLP, RLV, RRL, RP variant 45 - 800 RLN, RLNE, RRN variant 25 - 600
Manufacturer:	RATAJ a.s. , Doubravice 121, 370 08 České Budějovice, Czech Republic tel./fax: +420/ 387 240 910, 387 241 041, 387 241 630, 724 344 285 tel. +420/ 602 270 883, +420/ 777 270 883 http:// www.rataj.cz , e-mail: rataj@rataj.cz

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Please note the following information regarding your conveyor. It is necessary to know this information when ordering spare parts or in the case of loss or theft.

Serial number	
Delivery date	
Contract number	
Supplier	
Street	
City and post code	
Telephone, fax	

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2. Introduction

Dear Customer,

Thank you for purchasing our shaftless spiral conveyor RL, RLN, RRL, RLP, RLE, RLNE and RRN. Please read these Instructions for Use carefully, particularly the “Safety instructions” section before starting installation of the conveyor. Should you have any questions regarding assembly, operation, etc., please contact our company. Maximum satisfaction of the customer is one of our main objectives.

Ing. Stanislav Rataj
Chairman of the Board of Directors and Managing Director of RATAJ a.s.

The design of the rugged shaftless spiral conveyor is the result of many years of experience and verification of its performance in operation. The materials used for production are of a guaranteed quality and comply with technical specifications determined for production. Every single conveyor is manufactured and tested according to verified technical documents. Before starting work, the user and operator must become duly acquainted with the Instructions for Use. These contain important information on work safety, assembly, operation and maintenance, and it is necessary to consider these instructions as part of the conveyor. Trouble-free and safe work with the conveyor and its service life depend to a large extent on proper and meticulous maintenance. In case you do not fully understand any part of the information contained in the Instructions for Use, please do not hesitate to contact the manufacturer. After adding the data on the purchase of the conveyor, we recommend making a copy of the Instructions for Use and to store the original in a safe place, should the copy become lost or damaged.

When working with the conveyor, follow the safety instructions in order to avoid the risk of injury or causing injury to other persons nearby.

The safety instructions included herein are marked by the following warning safety symbol:



When you see this symbol in the instructions, read the message at the symbol carefully.

3. Application

The RL, RLN, RLP, RLE, RRL, RLNE, RRN rugged shaftless spiral conveyor (hereinafter only the conveyor) is designed for conveying loose materials in straight sections of slope from 0° to 90° over a maximum length of 30 m. The conveyor can also be used underneath storage tanks as an unloading or feeding conveyor and also as a stacking conveyor for filling reservoirs, silos, storage tanks etc. or for continuous transport of loose materials within technological processes.

The conveyor type RLxx is designed to transport non-adhesive materials with grain size from 0 to 300 mm (depending on the spiral diameter). The conveyor is designed particularly to transport fine and rough powders, food powders, cereals, plastic rubble, sawdust, chips, sand, dust, cement, lime, waste and other similar loose or ground materials.

The transported materials must not contain impurities of a much different shape and size.

Use of the conveyor in any way different from those stated by the manufacturer is contrary to the applications for which the conveyor is designed! This conveyor can be operated only by persons fully aware of its properties and the respective regulations regarding its operation. Any wilful changes of the conveyor made by the user release the manufacturer from its liability for subsequent damage or injuries! If the conveyor's character enables use of the conveyor for purposes different than those listed in the

application or prohibited methods of use, the user (if intending to perform such activities) must discuss this issue with the manufacturer.

4. Safety instructions

The conveyor complies with the requirements for work safety and hygiene, environmental protection and fire security stated in the generally valid legal regulations and respective technical standards.

4.1 Prohibited operations

- **It is prohibited to use the conveyor to transport volatile and explosive substances.**
- **It is also prohibited to operate the conveyor if any defect of the conveyor's structure or mechanism occurs or if the conveyor's safety elements are missing.**
- **It is prohibited to start and use the conveyor if the end flange, access and peep hole, input hopper, discharge or conveying piping are disassembled or damaged.**
- **It is prohibited to touch moving parts of the conveyor.**
- **It is prohibited to perform maintenance, cleaning and repairs when the conveyor is running and when not secured from an accidental or automatic start-up.**
- **It is prohibited to deactivate the safety, protective and emergency devices.**
- **The conveyor can be used in an environment presenting fire risk of inflammable dust, however, the conveyor is not designed for use in an environment with fire risk of inflammable liquids and explosion risk of inflammable gases and vapours.**



4.2 Work safety

Operation and maintenance can be performed only by workers over 18 years of age, having the physical and mental capacity to do so, and demonstrably trained for operation of the conveyor and acquainted with the safety regulations and instructions for use, which must be located in a place accessible by the operator.

- Adjustments, maintenance and cleaning of the conveyor can be performed only when the conveyor is switched off, the main switch is locked and the power supply is disconnected.
- Do not start the conveyor up with covers, hoppers, input or discharge units missing.
- Do not touch moving parts of the conveyor.
- Only a worker with appropriate electrical qualification and authorization can perform works on the electric equipment. Operators not meeting these requirements must in no way perform these works.
- The conveyor can be used only for the purposes for which it has been designed according to the conditions stipulated by the manufacturer and only if the technical condition of the conveyor complies with work hygiene and safety regulations.
- The operator must make sure that the conveyor's environment is kept tidy and clean, and he/she must pay attention to checking, lubricating and cleaning all functional elements.
- Should the operator discover a defect or damage that could jeopardize work safety or operation of the conveyor and which the operator is unable to remove, he/she must not start the conveyor up.
- In normal operation, the rotating spiral must turn in the direction of the arrow indicated on the conveyor.
- The safety signs, symbols and warnings designated on the conveyor must be kept in a legible condition. If they become damaged or illegible, the user must restore their original appearance.



- The covers, hoppers, discharges and end flanges can be removed, disassembled or taken off only if the conveyor is fully switched off and the main switch is locked. When the conveyor is running, all the covers and flanges must be duly fixed in the protective position.
- The covers designated by this symbol (black triangle with black lightning on yellow background) cover the areas containing electrical equipment. Before taking off these covers, the power supply of the electrical equipment of the conveyor must be disconnected, the conveyor must be switched off and the main switch must be locked!
- The parts showing this symbol (hand near the spiral conveyor) indicate places with risk of the spiral conveyor catching limbs. It is strictly prohibited to do anything in the area of the feeding hopper and discharge aperture when the conveyor is running!
- When cleaning the conveyor, it is necessary to use protective equipment (gloves, working clothes)

5. Fire protection



The conveyor is not equipped with fire extinguishers. The user must ensure that the premises where the conveyor is placed are equipped with fire extinguishers of an approved type and in an appropriate number, located in a visible place and protected against damage and misuse. The fire extinguishers are subject to regular inspections and the operator must be demonstrably acquainted with their use, as required by the respective act and decree.

With respect to the above-mentioned notice and in accordance with the provisions of the respective act, the user must use precautions to avoid the occurrence of fire. This means that when the conveyor is running, no inflammable liquids or any other hazardous substances or gases may be stored near the conveyor. Moreover, no smoking is allowed, no open fire can be used and the work procedure recommended by the manufacturer must be followed.

As the manufacturer does not equip the machine with fire prevention equipment, pursuant to the respective decree the user must ensure that a hand-held fire extinguisher be installed in a suitable place (dry powder type is recommended).

- It is prohibited to extinguish a fire on a conveyor under voltage using a water or foam extinguisher! Danger of injury caused by electric current!
- Fires in electrical devices must not be extinguished using water! The conveyor must be equipped with a powder, carbon dioxide or halon extinguisher and the operator must be acquainted with the use of such an extinguisher. If the conveyor is equipped with a water or foam extinguisher, these can be used only after turning off the electric current!
- All parts of the conveyor that become hot during the operation of the conveyor (electric motors, gearboxes etc.) must be regularly cleaned and deposited inflammable dust and other dirt must be removed so that the layer thickness never exceeds 1 mm.

6. Work hygiene



With regard to the fact that the conveyor cannot be used separately (it functions as a part of a technology line) and regarding various possibilities for its operating location, as early as during the design preparation stage, the user must pay due attention to the location of the conveyor with respect to the emissions of noise and dust. Before putting the conveyor (line) into operation, the user must ask the respective Hygiene Authority to approve the conveyor (line) operation. Should the maximum allowable values of emission of noise or dust be exceeded, this would result in taking alternative measures in order to reduce the emissions of noise and dust for workers (limiting the exposure period, ordering personal protective equipment, etc.).

7. Working conditions and work environment



The electric motors are delivered with IP 54 degree of protection or higher, providing so, according to the Czech National Standard ČSN EN 60529, protection against dust in such scope that it cannot affect reliable functioning, provided that dust on the surface of the electric motor is regularly removed.

- The conveyor can be used in the following environments (according to ČSN EN 33 2000-3)
 - :
 - AB 8 - outside areas and areas not protected against atmospheric influences
 - AE 4 - slight dustiness
 - B2N2 - danger of fire caused by inflammable dust
- With respect to the above-mentioned notice and in accordance with the provisions of Act No. 133/1985 Coll. On fire protection, the user must use precautions in order to avoid the occurrence of fire. This means that when the conveyor is running, no inflammable liquids or any other hazardous substances or gases may be stored near the conveyor. Moreover, no smoking is allowed, no open fire can be used and the work procedure recommended by the manufacturer must be followed.
- In case the conveyed material contains free water or if there is a chance that the material will freeze (or become frozen) in the conveyor, it is necessary to empty the conveyor before its putting out of operation in order to ensure smooth operation of the conveyor without any troubles during subsequent start up. The potential adjustments preventing the transported material from freezing (thermal insulation, heating cable etc.) are treated in the purchase contract separately with respect to the individual case. Emptying (cleaning) of the conveyor is described in the chapter Cleaning the conveyor.

8. Electric equipment

Wiring must be performed in accordance with the requirements of the respective standards and regulations, especially Czech National Standards ČSN 33 2000-4-41, ČSN EN 60204-1 (33 2200) and ČSN 33 2000-3 and the related regulations.

- Protection against injuries caused by electric current must be provided according to the requirements of Czech National Standard ČSN 33 2000-4-41 and related regulations.
- Work on the electric equipment pursuant to the Czech National Standard ČSN EN 50 110-1 ed.2 can be performed only by workers with respective electric qualification in accordance with the respective decree of the Czech Work Safety Authority and acquainted with the equipment in the scope required.
- Before the equipment is put into operation, an initial revision according to the Czech National Standard ČSN 33 1500 must be carried out. The owner of the conveyor must ensure that regular revisions of the electric equipment are performed in the periods set by ČSN 33 1500.
- The first connection of the conveyor electric equipment to the power supply can be performed only by a worker with the appropriate electric qualification, who, upon connection, will verify the proper functioning of the electric equipment, including proper functioning of the current protective systems and emergency switch off of the conveyor. Example of electric connection (see Fig. 1).



- **In case of explosion detection in the equipment connected with the conveyor (only for RATATEX - the system preventing from transfer of explosion) the conveyor must be switched off immediately.**

9. Location of the conveyor

The conveyor is a part of technology lines and its location depends on the user's requirements. It can be located at any stage of the technology chain.

10. Description of the conveyor's function

The conveyor works on the principle of a freely rotating rugged shaftless spiral in a circular cross-section. By rotation of the spiral, the transported material is moved from the feeder hopper towards the discharge aperture. There are no bearings along the entire length of the

conveyor and therefore in order to ensure the optimum transportation of the material and spiral centring in the piping it is necessary to fill up the conveyor in its entire cross section.

If the level of the conveyed material decreases below the stated minimum level, the level sensor (if installed) located in the feeder hopper transmits a signal to the switchboard in order to stop the conveyor. When the level of the material increases, the conveyor starts running again. The function of switching on and off is solved for every particular conveyor separately, on the basis of the user's requirements.

11. Technical description

The shaftless spiral including the piping is delivered in steel or stainless version (steel ST 37/52, AISI 304, AISI 316 or higher upon order). The pipe is delivered in addition in plastic design or eventually with plastic insert **RATAMID®** or basalt insert. External parts of the conveyor are equipped with baking powder paint. If the conveyor is designed for transport of foods, it is delivered in stainless version (AISI 304). The internal part of the piping and the spiral are not painted.

The RL, RLN, RLP, RRL, RRN shaftless spiral conveyor consists of the following parts:

- Rugged shaftless spiral (type RL - steel, type RLN - stainless)
- Flanged piping
 - (type RL - steel, type RLN - stainless, type RLP - plastic)
 - (type RRL - steel pipe with plastic insert **RATAMID®**)
 - (type RRN - stainless pipe with plastic insert **RATAMID®**)
 - (type RLE - steel pipe with basalt insert)
 - (type RLNE - stainless pipe with basalt insert)

Feeder hopper

- Level capacitance or propeller switch (if installed)
- Discharge aperture
- Safety flap switch (if installed)
- Drive unit consisting of electric motor, gearbox and a drive dog
- Jointing material

11.1. Shaftless spiral

The shaftless spiral is made of steel or stainless section of precisely defined dimensions. The spiral can include a magnet for the sensor of rotational movement of the spiral.

11.2. Flanged piping

The flanged piping is delivered in steel (steel ST37/52), stainless (AISI 304, AISI 316 or higher) version, or plastic design with plastic insert **RATAMID®** or basalt insert. The piping can include a mount for the sensor of rotational movement of the spiral.

11.3. Feeder hopper

The feeder hopper is delivered in different dimensions depending on the type and amount of transported material, or, as the case may be, a transition piece is also delivered and fixed directly to the existing equipment (storage tanks, silos, transport lines etc.). The feeder hopper can include flap, capacity or propeller-type switch responsible for switching the conveyor off in case the level of the material in the feeder hopper decreases. **In the case, when hopper serves for filling of material from bags or for manual filling, the operator must use safety screen, which can be delivered in steel or stainless design.**

11.4. Discharge aperture

The discharge aperture is delivered in different dimensions depending on the type and amount of transported material, or, as the case may be, a transition piece is also delivered and fixed

directly to the existing equipment (storage tanks, silos, transport lines etc.). The discharge aperture can include flap, capacity or propeller-type switch responsible for switching the conveyor off in case the storage tank or the transport line downstream of the conveyor is filled up.

11.5. Drive unit

The drive unit consisting of an electric motor and gearbox and a drive dog is usually connected to the motor flange by bolted connection. The drive dog provides mechanical transmission of the gearbox drive force to the shaftless spiral.

11.6. Jointing material

Jointing material enables detachable connection of the flanged piping and gearbox and can serve as a pendant or anchoring element.

12. Basic technical data for selected types of conveyors

Parameter	Unit	Value				
Type		RL, RLP, RRL, RRN, RLE				
Version		45	60	65	75	80
Spiral outer diameter	mm	45	60	65	75	80
Lead	mm	40	60	18	80	80
Spiral inner diameter	mm	15	20	30	27	27
Spiral thickness	mm	5	4-12	4-12	6-12	6
Conveying capacity	m ³ .h ⁻¹	0.01-1.5	0.01-1.5	0.001-0.5	0.01-2.0	0.01-2.0
Version		90	100	110	120	125
Spiral outer diameter	mm	90	100	110	120	125
Lead	mm	90	70, 100	110	120	125
Spiral inner diameter	mm	34	34	34	38	85
Spiral thickness	mm	6	6	6	6	15
Conveying capacity	m ³ .h ⁻¹	0.01-3.0	0.01-3.0	0.03-6.0	0.04-7.0	0.03-2.0
Version		130	140	150	160	170
Spiral outer diameter	mm	130	140	150	160	170
Lead	mm	130	95,140	100,150	105	115
Spiral inner diameter	mm	38	49	49	49	49
Spiral thickness	mm	6-15	8	8	12	12
Conveying capacity	m ³ .h ⁻¹	0.03-7.0	0.1-10.0	0.1-15.0	0.1-12.0	0.2-12.0
Version		180	190	200	220	230
Spiral outer diameter	mm	180	190	200	220	230
Lead	mm	180	135	135,200	220	230
Spiral inner diameter	mm	61	61	61	61	76
Spiral thickness	mm	12	12-20	12	12-20	12
Conveying capacity	m ³ .h ⁻¹	0.3-20.0	0.5-25.0	0.4-25.0	0.5-20.0	0.5-25.0
Version		240	250	275	280	315
Spiral outer diameter	mm	240	250	275	280	315
Lead	mm	140	250	275	190,280	315
Spiral inner diameter	mm	140	76	104	89	102
Spiral thickness	mm	20	12	20	12	12
Conveying capacity	m ³ .h ⁻¹	0.5-25.0	0.5-30.0	0.5-40.0	0.5-40.0	0.5-70.0
Version		350	380	400	450	460
Spiral outer diameter	mm	350	380	400	450	460
Lead	mm	350	380	265,400	440	460
Spiral inner diameter	mm	102	180, 120	120	120	300
Spiral thickness	mm	12	30	12	12-30	25
Conveying capacity	m ³ .h ⁻¹	1.0-150.0	3.0-200.0	2.0-200.0	3.0-230	4.0-180.0
Version		500	520	600	750	800
Spiral outer diameter	mm	500	520	600	750	800
Lead	mm	500	360	400,600	600	600
Spiral inner diameter	mm	140	273	169	410	344
Spiral thickness	mm	12	25	12	20-40	30
Conveying capacity	m ³ .h ⁻¹	4.0-180.0	4.0-250.0	5.0-600.0	20.0-500.0	10.0-1000.0

Parameter	Unit	Value				
Type		RLN				
Version		25	45	50	55	70
Spiral outer diameter	mm	25	45	50	55	70
Lead	mm	15	40	60	50	60
Spiral inner diameter	mm	12	15	20	25	22.27
Spiral thickness	mm	4-12	4-12	8-12	4-12	6-12
Conveying capacity	m ³ .h ⁻¹	0.001-0.2	0.01-0.5	0.01-0.5	0.01-0.5	0.01-2.0
Version		80	90	100	110	120
Spiral outer diameter	mm	80	90	100	75,110	120
Lead	mm	80	90	70, 100	110	120
Spiral inner diameter	mm	27	34	34	34	38
Spiral thickness	mm	5	5-12	6	6	6
Conveying capacity	m ³ .h ⁻¹	0.01-2.0	0.01-3.0	0.01-3.0	0.03-6.0	0.04-7.0
Version		140	150	180	200	230
Spiral outer diameter	mm	140	150	180	200	230
Lead	mm	140	100,150	180	200	230
Spiral inner diameter	mm	49	49, 60	61	61	76
Spiral thickness	mm	8	8	10-20	10-20	10-20
Conveying capacity	m ³ .h ⁻¹	0.1-7.0	0.1-15.0	0.3-20.0	0.5-20.0	0.5-25.0
Version		240	257	275	280	315
Spiral outer diameter	mm	240	257	275	280	315
Lead	mm	145	205	260	280	205
Spiral inner diameter	mm	140	102	80	89	102
Spiral thickness	mm	15-20	12-25	12-25	12-25	10-20
Conveying capacity	m ³ .h ⁻¹	0.5-20.0	0.5-25.0	0.5-25.0	0.5-40.0	0.5-60.0
Version		300	315	350	400	600
Spiral outer diameter	mm	300	315	350	400	600
Lead	mm	300	205	350	400	400
Spiral inner diameter	mm	89	102	102	120	120
Spiral thickness	mm	12-25	10-20	10	10	12
Conveying capacity	m ³ .h ⁻¹	0.5-70.0	0.5-60.0	1.0-150.0	3.0-200.0	3.0-400.0

The above capacities are informative, and are valid for materials of particle size up to 10 mm with bulk density 0.6 t/m³ in transport in horizontal direction. Individual capacities of the conveyors shall be specified in the contract of purchase, or confirmed order.

12.1. Derived versions

The derived versions are based on the same conveying principle; the only difference is in the diameter of the spiral, diameter of the piping and the type of gearbox. With regard to the fact that the conveyors are designed for conveying a variety of loose materials of very different physical properties, designs of the respective diameters of spirals, piping and gearboxes are solved individually for each individual conveyor.

13. Control elements

Considering the fact that the conveyor is installed within technology lines, the control elements are designed in each individual case according to the respective technology for automatic or manual operation. The control signal for switching the conveyor on or off can be implemented using capacity, flap or propeller-type level sensors or in other way, as required by the customer.

14. Operation and maintenance

Operation of the conveyor under normal operating conditions includes:

- Starting the machine - automatically or manually, according to the user's needs.
- The operation itself consists in ensuring a continuous supply and removal of the conveyed material.
- Switching the machine off - automatically or manually, according to the user's needs.

14.1. Safety instructions

- The conveyor can be loaded only up to the nominal value of current taken by the electric motor, as indicated on the label of the electric motor.
- Any work on the conveyor can be performed only when the conveyor is switched off and secured against accidental start up (the main switch locked in the “off” position).
- When performing maintenance and cleaning of the parts presenting danger of hand injury, it is necessary to use protective gloves, work clothes and other suitable equipment.
- All rotating parts of the conveyor are covered (the covers are provided with pictograms). Before starting operation, it is necessary to check that the covers are fixed properly, the spiral is turning in the right direction (see the pictograms) and that the electric motor is connected correctly.



- The conveyor's maintenance consists in regular inspection of the gearbox oil level (see the annex Instructions for installation, operation and maintenance of the gearbox) and inspection of flanged connections of the conveying piping and inspection of screwed connection of plastic inserts RATAMID® (if installed).
- In the case, when hopper serves for filling of material from bags or for manual filling, the operator must use safety screen.
- It is forbidden to mix or release transported material in the feeder hopper by means of any objects including hands, when the conveyor is running. There is a danger of injury by rotating part and destruction of the spiral.

Valid only for types RLE and RLNE



- It is forbidden to beat or hammer on the external pipe of the conveyor with any means, if basalt inserts are installed in the conveyor, and any impacts of the pipe on a hard surface shall be excluded.
- It is prohibited to operate the conveyor with basalt insert at the temperature of the transported material higher than 400°C.
- It is prohibited to use the conveyor for transport of materials, at which thermal shock can exceed 150°C.
- It is prohibited to perform repair operations using flame welding, arc welding, plasma welding or similar methods close to the basalt inserts.
- In case of explosion detection in the equipment connected with the conveyor (only for RATATEX - the system preventing from transfer of explosion) the conveyor must be switched off immediately.

14.2. Cleaning the conveyor

In order to ensure optimum operation of the conveyor, the conveyor must be continuously filled up by the transported material in its entire cross section. This also applies for the moment of switching the conveyor on and off, i.e. the conveyor is started up and stopped under a full load of the conveyed material. If the conveyor is used for transport of foods or materials that rapidly change their physical properties, it is necessary to clean the conveyor before removing it from operation. The principle of cleaning consists in unscrewing the end flange of the conveyor and reverse run of the shaftless spiral. The material that has remained in the conveyor after its switching off is removed from the conveying piping by the reverse run of the spiral. The reverse

run of the conveyor is solved individually for each individual case. For instructions for unscrewing the end flange see the chapter Work safety.



While the conveyor is running, do not remove the end flange and covers of cleaning holes or access and peep holes – danger of injury by rotating part.

14.3. Extra precaution for types RLE and RLNE (conveyors with basalt insert)

The conveyors with the basalt insert must be assembled, maintained and repaired so that the basalt insert does not break. The basalt inserts are very brittle, and may crack by beating with hammer or similar tools.

15. Designation

Every conveyor is designated by a name plate or name plates containing the following data:

- Manufacturer's identification (conveyor name plate)
- Conveyor name (conveyor name plate)
- Conveyor type (conveyor name plate)
- Year of manufacture (conveyor name plate)
- Serial number (conveyor name plate)
- Weight (conveyor name plate)
- Drive motor type (motor name plate)
- Connection to power supply (motor name plate)
- Degree of protection (motor name plate)
- Gearbox type (gearbox name plate)

RATAJ		Nedabyle 12, 370 06 České Budějovice Česká republika, e-mail: rataj@vol.cz Tel./Fax: +420 387 240 910, +420 387 241 630, www.rataj.cz	
BEZOSÝ SPIRÁLOVÝ DOPRAVNÍK		CE 1026	
Typ		Výrobní č.	
Potrubi (mm)		Rok výroby	
Příkon (kW)		Hmotnost (kg)	
Napětí (1*230 V)	☐	Napětí (3*400 V)	☐
Stupeň krytí elektromotoru IP 55		ATEX	Ne ☐ Ano ☐
		ČSN EN ISO 9001:2001	

16. Delivery and takeover of the conveyor

The conveyors are delivered disassembled as a separate machine to both direct and indirect clients and solely in the presence of a chief assembler is the conveyor assembled and put into operation. In the case that the conveyor is short, of simple design, etc. it is possible to deliver it assembled, without the chief assembler presence, and this fact shall be agreed in the relevant purchase contract. The electric gearbox is delivered including the gearbox oil. The delivered conveyor is taken over on the basis of the issued delivery note.

17. Conveyor assembly and putting into operation

The conveyor assembly and putting into operation shall be carried out with the

participation of the chief assembler of the manufacturer (if not stated otherwise in the purchase contract). The conveyor is fastened to a fixed structure by means of steel sections, screws, or dowels. The assembly of conveyors with basalt insert shall be governed by specific measures mentioned in 14.1 and 14.3.

A manipulation area of about 1 m is necessary mainly at the filling and discharge side of the conveyor. Connecting of electro motor and level sensors or emergency safety sensors must be carried out by responsible person of the user, and the connection must comply with relevant standards and ESČ (*mark of conformity with standards for electrical safety*)

Before first putting of the new conveyor into operation it is necessary to check the direction of rotation of the spiral (**ATTENTION - it need not be in accordance with the sense of rotation of the fan of the electric motor!**) and the correct function of the emergency or level sensors. The direction of rotation of the spiral is shown in the pictogram placed at the mounting hole at the gearbox or on the end cap of the spiral, or in a place enabling safe check of the direction of rotation of the spiral.

After checking the correct direction of rotation of the spiral it is possible to pour the transported material in small quantities in the input hopper. Due to the empty conveyor (without material), after the start the conveyor is noisy and could create vibration. At higher vibration the conveyor

must be turned off and then turned on and gradually filled with material. In gradual filling of the conveyor with the conveyed material, the spiral is centred in the conveyor, and noise and vibration will decrease. In case of continuing vibration or big noise or unforeseen situation (break or twisting of the spiral, burnt motor, broken plastic piping) the conveyor must be stopped immediately, and in case that the chief assembler of the manufacture does not take part in putting the conveyor into operation (which fact must be expressly stated in the contract of purchase), the user must immediately notify the manufacturer - RATAJ a.s. The shaftless spiral conveyor design enables conveyor switching on and off when it is fully filled with material.

Emptying before switching the conveyor off (permitted only in case of cleaning or change to other material) and idle run is not suitable for the conveyor, because the spiral and the pipe are exposed to intensive wear. This situation must be avoided.

18. List of spare parts and accessories

Upon special order, an updated catalogue of spare parts can be sent to users. Spare parts can be purchased directly from the manufacturer - RATAJ a.s. at the above stated address.

19. Packaging, transport, storage

Individual parts of the conveyor are packed in shrink-wrap or cardboard. Transport is mostly performed through a collection service or individually. All parts of the conveyor can be stored only in a dry and covered area. The electric motor with gearbox can be stored only in a position with the gearbox vent screw upward. Should the machine be stored longer than 1 year, it is necessary to provide preservation of metal parts.

20. Safety pictograms used on the conveyor

Notice

- The user must keep the pictograms in a legible state and in case of damage ensure their replacement. Fix (glue) the pictograms on the conveyor so that they are visible from all access directions. Pictograms used and their meanings:



- Before use read the instructions for use.
- Before performing repairs, adjustments or maintenance of the conveyor, disconnect the conveyor from the power supply and follow the instructions.
- Do not put hands in the area with rotating parts – danger of being pulled in the machine.
- Do not linger near the conveyor when it is running – stay at a safe distance.
- Before opening or removing the covers, wait until the entire equipment is stopped and then disconnect the conveyor from the power supply.

21. Disposal of the product and its parts

Once the service life of the conveyor expires, disassemble the conveyor down to the individual parts – metals, plastics, rubber and operating liquids. Treat these separated wastes as stated in valid regulations regarding waste handling.

22. Conditions of guarantee

22.1. Guarantee period

The seller provides for the delivered goods a guarantee for a period of 12 months from the date of delivery. A longer guarantee period is only possible for a surcharge of 2% for every one additional month. This fact must be mentioned in the contract of purchase.

22.2. Liability for transported material

If the seller will not be handed over a filled in questionnaire with complete data about the transported material and required outputs, and also a sample of the material to be transported, if the sample is required by the seller, on contract signature at the latest or at receipt of an order from the buyer, the seller shall not bear any liability for eventual damage incurred on the conveyor and other damages, and all guarantee obligations of the seller regarding the functionality of the conveyor will cease.

If a medium differing from the handed over sample or a medium of different granulometry, medium with overpressure or underpressure, or with different physical or chemical properties is used for the transport and this fact is not stated in the contract of purchase, questionnaire or inquiry, the seller will bear no guarantee for the functionality of the equipment. The same is valid for media, which have not yet been transported by the seller's shaftless spiral conveyors. This fact must be mentioned in the contract of purchase. Allowable tolerance of physical and chemical properties of the transported material as specified by the customer is +/- 10%.

In case that a test certificate of the handed over sample of the transported material issued by an accredited laboratory is part of the contract, the values stated in the report shall be binding for both the buyer and seller.

22.3. Liability for damage

The seller is not liable and shall not answer for any damage to the equipment or other damage caused by unprofessional operation of the conveyor, unauthorized interventions in the conveyor without written consent of the seller or in consequence of presence of foreign objects or admixtures in the transported material. Allowable manufacturing tolerance of dimensions of the spiral (diameter, lead) and the piping (diameter) is +/- 5 mm from the dimensions specified in the contract of purchase or in the marketing materials (leaflets, internet, etc.). The conveyor must only be used for the work, for which it is designed, and only for the transported material specified in the contract of purchase. The guarantee does not cover natural wear of the spiral and piping from the transported material, and for the wear of the spiral and piping in case that the conveyor works with the material filling it less than 50% or idling, and the defects that arise from defective electrical installation or incorrectly set or missing current protection of the electric motor. The guarantee also does not cover the defects arising from defective function of the equipment upstream and downstream of the conveyor. The buyer shall test the conveyor thoroughly as soon as it is put into operation. The buyer shall claim eventual defects in writing in 7 days after the conveyor putting into operation or during the test operation, otherwise the conveyor will be considered accepted by the buyer.

Compensation for eventual financial losses incurred as a result of conveyor's defect are excluded, if not expressly stated in the contract of purchase and if the seller's fault is not proved. The duty of compensation by the seller is limited by the amount, which was invoiced for the delivered conveyor.

If the buyer purchases separately only certain parts of the conveyor (e.g. the spiral) or the conveyor without assembly or chief assembly, or if he puts the delivered conveyor into operation without the knowledge and consent of the seller, the seller in no case gives any guarantee for the purpose of use, operation, functionality and service life of the delivered parts of the conveyor. The buyer shall bear the cost of eventual damage and of subsequent putting the equipment into operation.

22.4. Explosive environment (ATEX)

In case that the buyer requires installation of the conveyor in an explosive environment (ATEX), the buyer (or end user) shall duly fill in and hand over to the seller a questionnaire (original) about the conveyor environment. The questionnaire shall be filled in and signed only by the end user of the conveyor, not a third party. In case that the buyer requires only electric gearbox to the conveyor (not the whole conveyor) for an explosive environment (ATEX), the conveyor completed by such gearbox is not intended for the environment with explosion hazard.

23. Complaint conditions

In the case when the buyer calls the seller in writing to repair the conveyor and when it is not possible to determine the causes of a failure in advance, or it is not possible to determine who will pay the cost of the repair, the buyer will pay 100% of the expected cost of the repair in advance. The complaint sent by the buyer shall include photo documentation of the claimed part of the conveyor or of the defect. In the case that the seller's fault is proved after the seller's arrival, the seller will issue a credit note to the buyer and return the paid amount to the buyer, or a part of the amount, if both the parties agree.

23.1. Conveyor's output

In the case that after installation at the end user the delivered conveyor shows small hauling performance (lower by min. 15%), or too big hauling performance (higher by min. 15%) compared to the value stated in the contract of purchase or confirmed purchase order, the seller will adjust the hauling performance at his own expense to the contractually agreed performance +/- 15%.

23.2. Electric gearbox (gearbox + motor)

Immediately after putting the conveyor into operation, the end user or buyer shall measure the current of the electric motor, and perform the check against the motor nameplate data. In case that the motor current consumption is higher by 10% than the nominal current of the motor, the end user or buyer shall put the conveyor out of operation immediately, and notify this fact to the seller. In this case the seller will remedy the matter (by replacement of the motor or gearbox) at his expense. In case of motor burning due to overheating or due to the motor operation at taken current higher than 10% over the nominal current, the seller will ensure eventual replacement of the motor or electric gearbox for 100% payment of all costs before the replacement itself.

24. After-guarantee service

Requests for service works, guarantee repairs etc. must be claimed at the above mentioned address of RATAJ a.s.

25. List of operating documentation

The conveyor is delivered including the following documentation:

- Delivery note and acceptance record
- Instructions for use of the conveyor
- Instructions for installation, operation and maintenance of the gearbox
- Drawings - dimensional drawing, schema
- CE declaration of conformity