



LMR s.r.o., Svazarmovská 2287, 738 01 Frýdek - Místek CZ



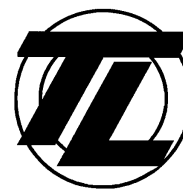
INSTRUCTIONS FOR USE

No. NP1

for

BRAKING CARRIAGE for overhead monorails of heavy type type **BTs**

dwg. No. 10.00.001



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Braking carriage type BTs		Approved by: Rak

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1. IN GENERAL

These instructions for use (hereinafter referred to as NP1) inform the user about the function, installation, safe use, maintenance and disposal of braking carriage, type BTs, manufactured by LMR s.r.o. The braking carriage, type BTs (hereinafter referred to as the braking carriage) is a mechanical-hydraulic self-supporting emergency braking device with continuous braking effect, designed to run on overhead monorail of heavy type (transport route in the form of single-track sections comprising supporting profiles I155 or others compatible therewith, anchored to the build mining support or rock bolts with matching carrying capacity in workings driven in bearable rock).

Instructions for use is mandatory for all producers and users of the products.

Instructions for use are prepared according to the requirements of Government regulation no.176/2008 Coll., Article 1.7.4. (Directive No. 2006/42/EC). The products are manufactured according to assembly drawings respecting the selected requirements from the applied standards ČSN EN ISO 12100:2011, ČSN EN ISO/IEC 80079-38:2017, ČSN EN ISO 80079-36:2016 and Czech Mining Authority Decree No. 22/1989 Coll. as amended, as evidenced by Certificate. The braking carriages in question are designed to properly fulfil their safety function and can be used in accordance with the instructions for use, general safety regulations and maintained in a manner protecting legitimate interests when these operations are carried out under the conditions foreseen by the manufacturer in these instructions for use.

The manufacturer issued a declaration of conformity with standards, regulations and guidelines set out in article 20, under which this machinery has been constructed.

1.1 Information about the manufacturer

Name and seat of the company: LMR s.r.o., Svazarmovská 2287, 73801 Frýdek-Místek, CZ
Company plant: Svazarmovská 2287, 73801 Frýdek-Místek, CZ
Business ID and Tax ID: 25395068 / CZ25395068

2. DESIGNATION OF MACHINERY


Each braking carriage is marked by a type plate that contains the following information:

a) *name and address of the manufacturer:* LMR s.r.o., Svazarmovská 2287, 73801 Frýdek-Místek, CZ

b) *name of machinery:* Braking carriage

c) *type of machinery:* BTs

d) *sign of conformity:* CE

e) *group and category:*  **I M2 Ex h I Mb** special temperature range: $+5^{\circ}\text{C} \leq T_a \leq +40^{\circ}\text{C}$

f) *certificate No.:* FTZÚ 04 ATEX 0344

g) *net weight:* 200kg

h) *month and year of manufacture:* 1/2019

i) *serial number:* serial number

j) *manufacturer logo:*



3. EU DECLARATION OF CONFORMITY

The manufacturer has issued Declaration of Conformity (which is an integral part of these Instructions for use - appendix No.6), the manufacturer fulfills the requirement of Government Decree No. 116/2016 as amended and Directive 2014/34 / EU, as amended. Braking carriage, type BTs, with its design corresponds to the technical documentation prepared by the manufacturer. This conformity and satisfactory performance in fulfilling the safety functions are supported by certificates issued:

- Fyzikálně technický zkušební ústav s. p., (Physical Technical Testing Institute, state-owned enterprise), Notified Body No. 1026, Ostrava-Radvanice, Certifikát č: **FTZÚ 04 ATEX 0344**
- Technické laboratoře Opava a.s., (Technical laboratories Opava, joint stock company) Notified Body No. 1384, Těšínská 2962/79B, Předměstí, 746 01 Opava
- Systémové certifikace s.r.o., Mostárenská 1140/48,703 00 Ostrava – Vítkovice, CZ certification of quality management system according to **ISO 9001:2015**

Braking carriage, type BTs meets the following regulatory requirements:

- Act No.22/1997 Coll. as amended
- Czech Mining Authority Decree No. 22/1989 of Coll. as amended,
- Basic requirements according to Annex 1 to Government Regulation No.176/2008 Coll. as amended (Directive 2006/42/EC),
- Basic requirements according to Government Regulation No. 116/20016 Coll. as amended (Directive 2014/34/EU),
- ČSN EN ISO 12100:2011, ČSN EN ISO 4413:2011, ČSN EN ISO 80079-36:2016, ČSN EN ISO 80079-37:2016, ČSN EN ISO 13857:2008, ČSN EN ISO/IEC 80079-38:2017, ČSN EN ISO 14120:2017

Braking carriage BTs meets the requirements for use in potentially explosive atmospheres according to Art. 6.3.2 of EN 1127-2:2014, with limited content of methane in the atmosphere to the value set by the regulations in the user's country. These includes facilities of group I, category M2 with protection by safe structure "c" according to ČSN EN ISO 80079-37:2016.

(In the Czech Republic in areas with danger of explosions of methane and coal dust, classified according to section 232, paragraph 1, point. b) and section 233, paragraph 1, point. b), (Group I, category M2 according to Annex No. 1 of Directive 2014/34/EU) of the Czech Mining Authority Decree No. 22/1989 Coll., as amended, including mines with danger of outbursts of rocks and gases and mines classified as hazardous mines with rockbursts, with an exception in areas with potentially explosive methane classified according to section 242, paragraph 3 of the same decree.)

Due to the principle of operation of the BTs, creeping discharges are not expected.

4. DESCRIPTION

4.1 Destination

Braking carriage BTs is designed to secure sets with loads of proper weight against driving, moving in a suitable, inclined monorail lines of suspended tracks during rope transport, monorail locomotive of other traction means. Its function lies in the fact that when travelling at speed exceeding the set transport speed, its jaws mounted with carbide corpuscles grip the web of the track profile. It is connected with the secured set by means of special connecting rods.

4.2 Technical parameters:

a) Traffic route – overhead monorail	identified as ZD24 (A, B, C, D/130) with the carrier profile I155 or with a profile compatible with it
b) Operating speed	0 - 2 m.s ⁻¹
c) Maximum speed for brake command to brake (set tripping speed)	3,2 ±4% m.s ⁻¹
d) Speed limiter rotations when issuing a command to brake (tripping speed limiter rotations)	510 ±4% ot.min ⁻¹
e) Maximum track incline	+/- 30°
f) Maximum reaction time	0,3 s
g) Minimum static braking force	52 kN
h) Minimum operating braking force	44 kN
i) Maximum allowable braking distance with load according to Annex 1	11 m
j) Maximum delay for transport of persons	9,81 m. s ⁻²
k) Maximum weight of braked set at 30 ° track incline	3.700 kg
l) Minimum weight of braked train of wagons for transport of persons	2.000 kg
m) Net Weight	200 kg
n) Working environment with hazardous atmospheric conditions according to ČSN EN 1127-2:2014	2
o) Temperature of working environment	+5 °C to +40 °C
p) Hydraulic system working pressure	13 ±1 MPa
q) Maximum number of two-strokes of hydraulic gen. to generate the working pressure	30 x
r) Volume of working liquid	0,8 l
s) Total mass depending on operating track incline	see Annex No.1
t) Plastic grease	MOGUL LV2-3
u) Working liquid	hydraulic oil MOGUL OT-HP3 or compatible type

Parameters **d) tripping speed limiter rotations** and **e) maximum track inclination**, can be adjusted by the manufacturer on request. Changes in individual technical parameters and operating conditions will be specified in a special supplement.

4.3 Description of the main functional elements (items, see Annex No. 2):

Frame (item 02) - is designed as a steel weldment and serves for attachment of all functional elements.

Braking device - works on the principle of the hydraulic release of the main spring and serves to generate clamping force on the web of track profile. It consists of a main and auxiliary spring embedded in a system of cylinders (item 50), brake wedges (item 45) and two brake levers (item 40 and 49) mounted on one end with roller bearings (item 44) and with brake jaws (item 08) on the other.

Hydro generator (item 20) - used to create oil pressure in the hydraulic system to push the main spring and release BTs, it is controlled by a lever system (item 05) and consists of a body, piston and return valves at the inlet and outlet. To reduce the operating forces an extension lever is used (item 90).

Shut-off valve (item 03) - ensures draining of the oil from the pressure to the tank and the maximum operating pressure. It consists of an adjusting screw and spring-loaded return valve.

Disconnecting valve (item 04) – ensures oil discharge from the pressure system to the tank, as well, consisting of lever/piston transmission and a spring type back-pressure valve.

Lever type switch off system (item 70) – is serving for transfer of the information on exceeding maximum permitted transport velocity, between a speed limiter and switch off valve (so called start up pulse). It consists of two double-beam levers and connecting braces.

Speed limiter (item 10) – secures permanent monitoring of the traveling velocity, being adjusted such a way, that its centrifugal mechanism would give the command to start braking (start up pulse) upon exceeding maximum permitted haulage velocity. It consists of double centrifugal regulator as well as the monitoring wheel.

Travel wheel (item 06) – total 3 pcs serve for BTs hanging and traveling, simultaneously secures permanent contact of the speed limiter monitoring wheel with the bearing section of the track-line route. Structure consists of the inherent wheel, bearing, bushing, and fastening bolt.

4.4 Function (basic functional states):

4.4.1 Idle state - corresponds to BTs in the tripped / braked state, when located outside the active segments of the suspended monorail track. Putting in the idle state is performed as follows:

a) using an extension lever (item 90) inserted on the trip lever mechanism adaptor
(Item 70)-fig.7

b) by pulling the blocking cord (item 76)-Fig.5

thereby flipping the tripping lever from standby position, opening the tripping valve (item 03) and releasing the pressurized oil to the tank (item 49). The hydraulic system has zero pressure, the main spring is stretched (in working position), brake levers with brake jaws (item 08) rest with clamping force on the web of the track profile, hence generating braking force.

4.4.2 Standby state - corresponds to BTs in the disengaged state. First of all it is necessary to secure the shut-off valve (item 03)-fig.7 and fig.8 by tripping lever mechanism (item 70) and press the disconnecting valve (item 04), and then use the manual hydrogenerator (item 20) and extension lever (item 90) to pressurize the hydraulic system (25-30 two-strokes)-fig.9, when pressurized oil performs compression of the main

spring through the inner cylinder piston. This will divert the brake levers from the web of the track profile and release the movement of BTs.

CAUTION! During the period of any manipulation in this state outside the track profile. or access to the brake levers and brake jaws it is always necessary to ensure securing of the main spring by means of the safety bolt (item 58) through the hole in the braking device-fig.3 and fig.4.

4.4.3 Working condition - occurs when the BTs is in standby mode and also receives the command to perform the braking cycle, i.e.:

- a) speed limiter (item 10) reached a speed corresponding to maximum transport speed, ejected the to a (by about 7 mm) outside the outer contour of the body itself and by the impact flipped the tripping lever mechanism (item 70) from standby mode, thereby opening the shut-off valve (item 03) and injecting the pressure oil into the tank (item 49).
- b) there was a spontaneous drop in pressure in the hydraulic system, which caused a slight shift of the main spring (by about 5mm) from the compressed position. This shifted the position of the outer cylinder and released the disconnecting valve(item 04) lever, lifted its piston and opened the spring check valve and then drained the pressure oil into the tank (item 49)
- c) for a passenger carriage you can perform direct manual emergency braking by means of the blocking cord being interconnected with rotary stopper (item 76) of the disconnecting valve (item 04), This way releasing of its little lever takes place, and furthermore see b)

the pressure drop in the hydraulic system will allow for expansion of the main spring, shift of the outer cylinder and retraction of the brake wedges (item 45) under the needle bearings (item 44) of the brake levers (item 40 and 49), causing exerting of compression force of the braking jaws (item 08) on the web of the track profile.

5. DRAWINGS, DIAGRAMS, DESCRIPTIONS AND EXPLANATIONS

necessary for the use, maintenance, repair, and checking for proper operation are listed in the Annexes of these instructions for use.

The braking carriage in question, type BTs (see the Assembly Drawing – Annex no. 2), is made by machining, welding and final assembly (incl. testing operations) of steel, rolled blanks and workpieces according to proprietary, elsewhere specified drawings. The materials used - structural or tempered steels are shown in drawings.

6. DESCRIPTION OF THE STATION TO BE OCCUPIED BY OPERATORS

Place of service is not exactly specified, and varies according to the phase in which the braking carriage is found. When handling with complete BTs it is necessary to avoid dynamic impacts, having braking mechanism secured against movement, remain in a safe place from which the operator has an overview of the behaviour of the load. When attaching to the track it is necessary to be very careful to avoid injury by pulling in between the carriage wheels and the supporting profile. After setting it to standby position while securing the set against unwanted shift it is not recommended to unauthorized persons to stay near the carriage during transport. The operator must watch from a safe place the behaviour of the load and its trouble-free transport. Weight of the

vehicle set must be in accordance with the loading diagram, valid for the used type of carriage and track incline so that the braking distance does not exceed the maximum allowable 11 m.

7. DESCRIPTION OF THE INTENDED USE OF THE MACHINERY

- Braking carriage BTs is designed to secure sets with standard loads or special loads of proper weight against driving, moving in a suitable, inclined monorail lines of suspended tracks during rope transport, monorail locomotive or other traction means. Its function lies in the fact that when travelling at speed exceeding the set transport speed, its jaws mounted with carbide corpuscles grip the web of the track profile. It is connected with the secured set by means of special connecting rods.
- Braking carriage BTs must prior to transport on an inclined track of the overhead monorail be connected to each separately transported vehicle or combination of vehicles (in accordance with the loading characteristics-*track incline & set weight*-see Annex No. 1) preventing their driving so that it is always placed before the set in the descending direction of incline.
- In case of a variable track incline at rope transport the BTs carriage must be connected at both ends of the set.
- During transport by means of monorail locomotive on the inclined overhead track the BTs braking carriage must be connected at the end of the set, preventing driving off of vehicles carried by the locomotive-*fig.2*.

8. WARNINGS CONCERNING UNACCEPTABLE USES

Braking carriage BTs must not be put out of operation and the course of ongoing transport in any manner. **CAUTION! The following is forbidden:**

- a) anyhow block the correct speed limiter function (item 10)
- b) remove, modify or in any way interfere with the function of the disconnection lever mechanism (item 70)
- c) use the safety bolt (item 58) to ensure the main spring of the braking device
- d) remove the side cover (item 01) and the base (item 80) in the course of monorail overhead transport.
- e) operate BTs in a damaged or incomplete condition, inconsistent with the instructions for use and inconsistent with loading characteristics (see Annex No. 1), i.e. that the *weight of the set for a max track incline* must meet the technical parameters of the braking carriage.

9. ASSEMBLY, INSTALLATION AND CONNECTION INSTRUCTIONS, including drawings, diagrams, and the means of attachment and identification

The braking carriage is inserted on the open carrying track profile, which is created for this purpose after dismantling the end stop.

Braking carriage is incorporated within a set of loads with traction device (eg. overhead monorail locomotive) in the manner described above – see *fig.2*.

BTs and individual vehicles are connected by means of tie rods of suitable type with parameters corresponding to the traction force of the traction vehicle. Connecting pins (supplied by the manufacturer) shall be secured against falling out. Disassembly is performed in the reverse order.

10. INSTRUCTIONS FOR INSTALLATION AND ASSEMBLY TO REDUCE NOISE OR VIBRATIONS

Braking carriage does not emit excessive sound pressure during normal operation. Braking is only momentary (approximately 2 seconds) and at that time the persons must not be present at the set.

11. INSTRUCTIONS FOR COMMISSIONING AND USE OF THE MACHINERY AND NECESSARY GUIDELINES FOR PROFESSIONAL TRAINING OF OPERATORS

11.1 Qualification of operating personnel

The braking carriage can be independently operated only by persons physically and mentally fit over 18, whose attention is not affected by disorders, medication, alcohol or drugs. Braking carriage operators must be provably made acquainted with these instructions for use, complying with the requirements specified by the organization and government regulations and are practically tested in theoretical and practical knowledge necessary for machinery operation. It is registered in a special list, in which each person confirms by signing that they were trained and instructed for their work.

11.2 Duties of operators prior to operation start-up in each shift:

- a)** try free rotation of the speed limiter (item 10) using a control bolt (item 105) to verify the speed-limiter finger function - Fig.6 and contact of the sensing wheel with travelling surface of the track profile
- b)** check security and operation of the tripping lever mechanism (item 70)
- c)** verify the proper function by manual tripping according to art.4.4.1 - *fig.5- fig.7*
- d)** visually check the condition of the travelling wheels (item 06), frame (item 02), hydraulic system tightness and safe connection and securing of the braking carriage with the train set.
- e)** put the BTs into standby mode using the procedure according to art.4.4.2 - *fig.7, fig.8, fig.9*
- f)** during operation BTs is characterized by the states according to art.4.4.3
- g)** the oil level in the tank at idle / braked state (see article.4.4.1) must be at the level of oil filler hole located on the brake lever (item 49), which also serves as the oil tank (when a non-conformity is detected, it is filled in with clean hydraulic oil)
- h)** for a passenger carriage, it is possible to perform direct manual emergency braking of BTs (using blocking cord interconnected with rotary stopper (item 76) of the disconnecting valve (item 04), – art.4.4.3 c). - *fig.5*

12. INFORMATION ON RESIDUAL RISKS that remain despite the measures adopted by manufacturer to ensure safety in design, safety measured and complementary protective measures

- ❖ During any handling with the braking carriage in standby state (see art.4.4.2) off the track profile (to perform a relocation, control, adjustment, testing, etc.) it is always necessary to use the safety bolt (item 58) to secure the main spring of the braking device through a hole in the braking device -*fig.3, fig.4*. **CAUTION! Risk of accident at the grip of braking jaws.**

- ❖ During the period of any access in standby mode (see art.4.4.2) to the brake jaws, brake levers, needle bearings, brake wedges and braking devices (for cleaning, lubrication, adjustment, repair, etc.), it is always necessary to use safety bolt (item 58) to secure the main spring of the braking device through a hole in the braking device - *fig.3, fig.4*. **CAUTION! Risk of injury at braking device activation.**
- ❖ Inspections and tests according to art.16.3, adjustment and repairs of individual components and the entire machine can only be performed by an employee with the relevant training by the manufacturer, using appropriate equipment with certified measuring and control instruments.
- ❖ Inspections and tests according art.16.4 can be performed only by the manufacturer or its authorized organization.
- ❖ Repairs of the braking carriage can only be performed using original spare parts supplied by the manufacturer.
- ❖ During transport on the overhead monorail tracks the operator must comply with the provisions of Mining Authority Decree No. 22/1989 Coll. as amended, traffic order, and refuse to tolerate the presence of people that are not involved in transportation.
- ❖ **CAUTION!** Any violation of the above-mentioned conditions of the manufacturer endangers the safety of the braking carriage BTs.

13. CONDITIONS UNDER WHICH MACHINERY MEETS THE REQUIREMENTS FOR STABILITY during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns

- The braking is stable in all circumstances during operation on the tracks.
- Braking carriage remains on the track after operation with the set protected against unwanted movement for example by manipulation stops and does not require any disassembly. It can be parked on a side track or in the depot. In case of any defect it can be pulled into a place for repair as well as the carrying carriage.
- During repairs or maintenance off the track it must be stabilized against overturning upon deposition on a support.
- During transport the supplier (consignor) is obliged to provide for submission of the shipment for transport to the carrier so as to avoid damage during haulage. The shipment submission for road transport is carried out by the supplier, deposition of the supply falls within the responsibility of the carrier (driver).

14. INSTRUCTIONS FOR THE SAFE TRANSPORT, HANDLING AND STORAGE, giving the mass of machinery

- Braking carriage is supplied with adjusted tripping and braking system together with inspection certificate according to ČSN EN 10204 in the form of a protocol on measured values.
- BTs is transported and stored in a dry environment (protected against weather conditions and water) in the idle state (according to Article 4.4.1), in one complete whole in the form of bulk shipment with operating oil charge and secured in the upright position. **CAUTION! In the case of roll-over there is a risk of leakage of hydraulic fluid through the venting hole.**

- BTs is transported as a whole by mechanization means to the place of destination and then using small machinery with assistance of the required number of workers it is put on the open track. The weight of BTs is listed in chapter 4.2 Technical parameters and method of attachment of slings during relocation is shown in *fig.1*.
- During any handling with the braking carriage in standby state (see art.4.4.2) off the track profile (to perform a relocation, control, adjustment, testing, etc.) it is always necessary to use the safety bolt (item 58) to secure the main spring of the braking device through a hole in the braking device -*fig.3, fig.4*. **CAUTION! Risk of accident at the grip of braking jaws.**
- When performing any work on the track it is necessary to have other vehicles secured against accidental movement.

15. PROCEDURE TO BE FOLLOWED IN THE EVENT OF ACCIDENT OR BREAKDOWN, IF IT CAN BE BLOCKED, THE PROCEDURE TO BE FOLLOWED TO SAFELY UNBLOCK YOUR DEVICE

- Braking carriage is permanently maintained in standby condition. In the case of braking without apparent cause the long-term operation resulted in operational leaks and subsequent shift of cylinder with spring and drift to the braked state. In this case, it is sufficient to use manual hydrogenerator to place the BTs carriage (in the way according to art.4.4.2, *fig.7, fig.8, fig.9*) back to standby mode and then can continue in transport.
- The braking carriage may have blocked or heavily rotating travelling wheel or speed limiter. BTs must be removed from the track, the wheels must be demounted in the workshop, bearings must be replaced and properly assembled.
- The hydraulic system in standby mode is under constant pressure of 13 ± 1 MPa. In case of leakage of some of the hydraulic components it will not be possible to perform pressurization and brake release (following the procedure according to art.4.4.2, *fig.7, fig.8, fig.9*). It is necessary to replace the defective component or mechanically compress the main spring of the braking device (by means of safety bolt (item 58), *fig.3, fig.4*) and thereby release the BTs and its free movement. **WARNING! banned method of use-BTs does not fulfil the safety function!**
- In the case of deformation or destruction of any connecting loop, exclude the carriage from operation and pass it to the manufacturer for repair or for scrapping. Dismantling is subject to a precise procedure, and therefore it must be performed only by trained personnel.

16. DESCRIPTION OF THE ADJUSTMENT, MAINTENANCE AND PREVENTIVE MAINTENANCE MEASURES to be followed

16.1 Duties of operators prior to operation start-up in each shift:

- a) try free rotation of the speed limiter (item 10) using a control bolt (item 105) to verify the speed-limiter finger function - Fig.6 and contact of the sensing wheel with travelling surface of the track profile
- b) check security and operation of the tripping lever mechanism (item 70)
- c) verify the proper function by manual tripping according to art.4.4.1 *fig.5-fig.7*
- d) visually check the condition and free rotation of the travelling wheels (item 06), frame (item 02), hydraulic system tightness and safe connection and securing of the braking carriage with the train set.
- e) put the BTs into standby mode using the procedure according to art.4.4.2 - *fig.7, fig.8, fig.9*
- f) during operation BTs is characterized by the states according to art.4.4.3
- g) the oil level in the tank at idle / braked state (see article.4.4.1) must be at the level of oil filler hole

located on the brake lever (item 49), which also serves as the oil tank (when a non-conformity is detected, it is filled in with clean hydraulic oil)

h) for a passenger carriage you can perform direct manual emergency braking by means of the blocking cord being interconnected with rotary stopper (item 76) of the disconnecting valve (item 04) – art.4.4.3 c).

16.2 Duties of operator: at least once in 14 days

perform the following (with a record into the "Operation log"):

- a)** checks and tests in the scope of Article 16.1 a) - d)
- b)** inspect, clean and assess the condition of functional surfaces of the brake shoes (item 08) - *fig. 10, 11, 12, 13*. **WARNING! Risk of injury, you must use the safety bolt (item 58) to secure the main springs of the braking device through a hole in the braking device - fig.3, fig.4.**
- c)** carry out lubrication of the machine according to the lubrication plan (Annex no. 4) and remove any deposited dust on the carriage frame by blowing (if necessary, depending on operating conditions, choose a shorter interval).

16.3 Duties of operator: at least once a month the following must be verified by means of qualified and calibrated gauges (with record into the "Operation log"):

- a)** speed limiter revolutions (item 10) when issuing the command to brake
- b)** static / operating static braking force

16.4 Duties of operator: at least once every two years

complex periodic test must be performed and documented (according to the Technical and professional regulation TPP 1) in the following extent:

- a)** speed limiter revolutions when issuing the command to brake
- b)** adjustment of functional elements
- c)** reaction time
- d)** static braking force
- e)** tightness of the hydraulic system
- f)** parameters in the dynamic test under load at 30 ° incline
- g)** parameters in the dynamic test under load at 5 ° incline

16.5 Emergency braking in the event that an emergency braking is required:

- a)** first of all to ensure safe securing of the entire set against accidental movement
- b)** BTs brake release using procedure according to article 4.4.2.
- c)** to clean braking jaws (item 08) and consider the necessity of their replacement – *fig. 13* (missing hard metal elements, failed surfaces, and irremovable inorganic contaminants are considered to be defective)
- d) during the transport of persons the braking jaws must be always replaced (item 08)**
- e)** perform inspection of BTs in the extent of article 16.1 to 16.3
- f)** make an entry into the "Operation log" indicating all material facts (weight of the set, track incline, stopping distance, driving cause, extent of damage, etc.).

16.6 BTs Set - mechanical-hydraulic connection of two or more separate braking carriages. In this case, it is securing of the load against a high weight, at which it is necessary to meet the provisions of section 314 of the Czech Mining Authority Decree No. 22/1989 Coll. for **Special transport**. Terms of assembly of BTs set and its operation shall be established by a **special amendment to these instructions for use upon request from the manufacturer!**

16.7 BTs operation must be clearly recorded in the "**braking carriage operation log**" with the above-mentioned basic data:

- results of inspections and tests of basic functions in accordance with article 16.2
- values measured in accordance with article 16.3
- description of all emergency brakings in accordance with article 16.5 f)
- all the performed repairs, parts replacements and adjustments, with any measured values and identification of performing person

16.8 Service life of the braking carriage BTs in the case of normal operating conditions is 6 years. After this period it is necessary to carry out its overhaul.

Replacement of bearings and sealing rubber hydraulic components (O-rings, cuffs, hoses, etc.) should be performed at least every four years. In case of leakage of the hydraulic system, replace the sealant at the manufacturer.

17. INSTRUCTIONS FOR SAFE ADJUSTMENT AND MAINTENANCE, PROTECTIVE MEASURES THAT SHOULD BE TAKEN DURING THESE OPERATIONS

❖ During the period of any access in standby mode (see art. 4.4.2) to the brake jaws, brake levers, needle bearings, brake wedges and braking devices (for cleaning, lubrication, adjustment, repair, etc.), it is always necessary to use safety bolt (item 58) to secure the main spring of the braking device through a hole in the braking device - **fig.3, fig.4**.

CAUTION! In the case of unsecured spring there is a risk of injury in case of accidental activation of the braking device.

- ❖ Repair connected with disassembly of the main spring is associated with a risk of injury. It is necessary to use a special mounting bolt to secure and gradually release the main spring of the braking device. Such disassemblies may only be performed by a trained maintenance operator.
- ❖ Inspections and tests according to art. 16.3, adjustment and repairs of individual components and the entire machine can only be performed by an employee with the relevant training by the manufacturer, using appropriate equipment with certified measuring and control instruments.
- ❖ Inspections and tests according art. 16.4 can be performed only by the manufacturer or its authorized organization.
- ❖ In case of paint repair, the old paint must be thoroughly removed at the repair site so that a layer of more than 2 mm is prevented.
- ❖ **CAUTION!** In case of any violation of the above-mentioned conditions the manufacturer does not guarantee the reliable operation of the safety device in question – braking carriage BTs,

and any improper intervention results in the invalidity of the declaration of conformity issued by the manufacturer.

❖ **Disassembly and disposal**

BTs metal parts that are not polluted by oil products can be disposed of by scrapping. Before disassembly of the individual units the hydraulic oil must be drained. The hydraulic oil, together with hydraulic hoses and rubber sealing elements must be disposed of in accordance with the law on hazardous waste disposal, it is best to entrust such waste products to specialized companies. Disassembly may be performed only by persons with appropriate qualifications and experience in the repair and maintenance of braking carriages, because improper disassembly of braking device endangers legitimate interest.

18. SPECIFICATIONS OF THE SPARE PARTS to be used, where they present an impact on user health and safety

- Spare parts to be used during the repair (a complete listing is given in the list of spare parts No.SND1) have to be supplied exclusively by the equipment manufacturer. Only these guarantee the continued compliance of the braking carriage with technical safety parameters and do not endanger the health and safety of the operator.
- The warranty period is 6 months from delivery unless the purchase contract provides otherwise. All defects and faults within this period must be reported immediately to the manufacturer in the form of complaint without intervening with the braking carriage. Corrective measure will be adopted in the shortest time possible (usually within 48 hours). Complaints shall not apply to defects caused by mechanical damage, tampering and violation of the terms and conditions specified in the instructions for use.
- All critical components are marked (embossed) by manufacturer's logo and critical points are fitted with a seal with the manufacturer's logo, upon the damage of which the user loses the right to claim any damages in the complaint procedure.

19. INFORMATION ON NOISE EMISSIONS AND AIRBORNE RADIATION

Braking carriage, type BTs is not a source of excessive noise or vibrations or non-ionizing radiation, which could cause harm to persons, in particular persons with active or non-active implantable medical devices.

20. RELATED DOCUMENTATION

Related standards, technical requirements and statutory regulations:

ČSN EN ISO 12100:2011	Safety of machinery - General principles for design - Risk assessment and risk reduction
ČSN EN ISO 4413:2011	Hydraulics - General rules and safety requirements for hydraulic systems and components
ČSN EN ISO 14120:2017	Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards
ČSN EN ISO/IEC 80079-38:2017	Equipment and components intended for use in potentially explosive underground mines


ČSN EN ISO 80079-36:2016	Non-electric devices for environment with a risk of explosion – Part 1: General methods and principles
ČSN EN ISO 80079-37:2016	Non-electric devices for environment with a risk of explosion – Part 5: Protection by constructional safety "c"
ČSN EN ISO 13857:2008	Safety of machinery - Safety distances to prevent reach to dangerous places with upper and lower limbs
Decree no. 22/1989 Sb.	of the Czech Mining Authority as amended by subsequent regulations.
TP a NPO 12 A 1471/84	ZD 24 monorail
TP a NPO 0007/95	ZD 24 B
TPP1	Adjustment and tests of braking carriage BTs
SND1	List of spare parts of the braking carriage BTs

21. ANNEXES

- Annex No. 1 - Weight of connected set, depending on the operating monorail track incline
- Annex No. 2 - Assembly drawings and major subassemblies
- Annex No. 3 - Hydraulic system diagram
- Annex No. 4 - Lubrication plan
- Annex No. 5 - Figures
- Annex No. 6 - EU Declaration of Conformity

In Frýdek Místek 30th October 2020

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Stamp:

