OPERATION MANUAL

PART I

Installation of the Antiramming Road Blocker (Cyclop) M30, M40, M50
Contents:

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Annex 1 - DD on manufacturing and installation of reinforcement cage.

The Manual is provided for joint use with the Operation Manual. Part II. Wiring of Road Blockers (RB series)

• This Manual is an integral part of the product and shall be handed over to the customer. The manual shall be kept for future use and to be consulted, if appropriate.

• If the Road Blocker is resold, handed over to another owner or transported to another place, make sure that this manual is enclosed to the product to be used by new owner and/or maintenance staff during installation and/or operation.

The following abbreviation are used in this Manual:

• M - Maintenance;
• HU - Hydraulic Unit;
• HC - Hydraulic Cylinder;
• R.s.l. - Road surface level (reference point ± 0.000)
DECLARATION OF EQUIPMENT CONFORMITY
(Directive __/___ EEC)

Manufacturer: The Company “TISO PRODUCTION”.

Address: 72 Yamska str., Kyiv 03680, Ukraine

Confirmation of compliance with fundamental safety requirements specified in the following Directives EEC:
- 2004/108/EC;
- 2006/42/EC
1. General safety guidelines

The Manual should be scrutinized prior to the equipment installation and operation to ensure safety of people. Safety is not ensured in case of improper operation or use.

- The Company “TiSO” does its best to provide surety and accuracy of this Manual and reflect substantial design modifications. Continuous improvement may cause little differences between the equipment to be supplied the description herein.

- The Manual to be kept for future use.

The personnel servicing operating electrical installations or performing their adjustment, wiring, repair, maintenance and installation shall be trained to handle the relevant model! Training shall be performed by the product manufacturer or product manufacturer's representatives!

- Operating equipment to be beyond the reach children and outsiders. The manufacturer shall not be liable for violation of safety rules.

In case of improper operation and noncompliance with requirements of instruction manuals the road blocker may constitute a danger to life and health of people by presence of increased voltage in electric circuits and movable parts!

- The product to be transported in only down state!

- Any actions that are not explicitly specified in this Manual are prohibited.

- Safety devices provide security of potentially hazardous areas.
1.1 Instructions to installer:

1. The equipment installation instructions shall be complied with for the purpose of safety.

2. The road blocker shall be installed according to the code of practice in compliance with safety regulations for installation.

3. The equipment shall be installed when it is deenergized.

4. Packing materials are subject to disposal according to the applicable standards.

5. The road blocker installation procedure, specified in the Manual, shall be strictly observed.

- It is forbidden to modify the equipment configuration and to use materials and components being outside the scope of delivery and not specified by this Manual.

- It is forbidden to install equipment during thunderstorm, heavy rain or snowfall, in explosive environment and obscured conditions.

- Installation area shall be prepared according to the applicable standards.

- The road blocker shall be installed, connected and precommissioned by qualified professionals.

6. When faults or defects are detected, the Supplier's service department shall be referred to;

7. The installer shall provide the user with the required information on operation of the system in manual mode in case of emergency

8. The manufacturer shall not be liable for the equipment operation in the following events:
   - noncompliance with installation procedure;
   - use of nonstandard materials and components;
   - performance of work by unqualified personnel.

9. The manufacturer shall not be liable for compliance with safety measures during installation of equipment by the personnel outside the Company's service department.
1.2 Instructions to user:

1. The operation regulations, prescribed by this Manual, shall be strictly observed.
2. No modifications of the equipment components shall be made.
3. The equipment shall be used for intended purposes, specified by the manufacturer.
4. Don’t try to repair or adjust the road blocker on your own. The relevant service department shall be referred to. Breaking of seals shall cancel the manufacturer’s warranty liabilities.
5. The road blocker control units (panels) shall be beyond the reach of outsiders.
6. The manufacturer shall not be liable for improper operation of equipment and violation of safety measures by the user.

- The Road Blocker must be installed, precommissioned and serviced by certified professionals having the relevant qualification and being familiar with the product design and instruction manuals:
  - installation and operation manual (Part I, Part II);
  - datasheet;
  - instruction manuals for components.

- Technical inspections, maintenance, adjustment and repair shall be performed only when the road blocker is deenergized.

- The device, designed and manufactured in accordance with directives of the European Union, shall be marked according to CE standards.

Make sure of availability of the plate with manufacturer’s details:
2. Product Description

2.1 The automatic antiramming road blocker with hydraulic actuator is a static platform with built-in anticrossing element (raising platform). In down position it does not prevent vehicle access to the protected area (site). In up position the anticrossing platform prevents unauthorized vehicle access. Index of assured protection - ASTM F 2656M -15+IWA14-1, M40 (K8).

2.2 Coating - warning paint; (Option 1: black and yellow. Option 2: red and white);

2.3 Actuator - hydraulic, with external or internal hydraulic unit;

2.4 The road blocker can be controlled:

- from wire or wireless remote control panel;
- automatically via access control system;
- manually (manual sinking in case of power failure).

Independent control of two road blockers with one control unit and parallel (simultaneous) group control of more than two road blockers are allowed.
3. Purpose

3.1 The road blockers are used at public, commercial and private facilities for unauthorized vehicle access control, vehicular traffic management and regulation at different sites and adjacent areas.

3.2 The road blockers are recommended for passenger transport facilities, approaches to sports facilities and government facilities, to be installed in front of shops, hotels, shopping malls and office centers, health care facilities, at the approaches to cottages and cottage settlements, at central urban and historical sites, industrial and special facilities.

3.3 The road blockers can be installed in conjunction with other traffic control and unauthorized access prevention equipment.

3.4 By impact of environmental factors the road blocker complies with EN 300 019-1-4 and is designed for operation in moderate climate (class 4.1) with acceptable ambient temperature -33°C to +40°C.

3.5 The road blocker index of assured protection complies with the standard ASTM F 2656M-15 + IWA14-1.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Mass, M (kg)</th>
<th>Speed, S (km/h)</th>
<th>Anticrossing platform lift height, h (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M30 (K4)</td>
<td>6,8</td>
<td>48</td>
<td>800</td>
</tr>
<tr>
<td>M40 (K8)</td>
<td>6,8</td>
<td>64</td>
<td>900</td>
</tr>
<tr>
<td>M50 (K12)</td>
<td>6,8</td>
<td>80</td>
<td>1100</td>
</tr>
</tbody>
</table>

ROAD BLOCKING SYSTEMS

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3.6 Certificates

The products AUIA-320-02 has been successfully tested (crash test) within the certification system ASTM F 2656M-15+IWA14-1 in class:

- **M40 for the Road Blocker AUIA-320-02**

![Certificate]

**Certificate**

of passed Barrier Testing Programme

ASTM F2656/F2656M-15 + IWA14-1, M40, 12th September 2016, CTS-Test No: 18476

<table>
<thead>
<tr>
<th>Type of product:</th>
<th>Road Blocker Cyclope „AUIA - 320-02“</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle penetration:</td>
<td>1.7 m</td>
</tr>
<tr>
<td>Mass (Target):</td>
<td>7200 kg (±150 kg)</td>
</tr>
<tr>
<td>Mass (Test):</td>
<td>7228 kg</td>
</tr>
<tr>
<td>Impact speed (Target):</td>
<td>64.0 km/h (63.0 km/h - 67.0 km/h)</td>
</tr>
<tr>
<td>Impact speed (Test):</td>
<td>65.1 km/h</td>
</tr>
<tr>
<td>Angle:</td>
<td>90 °</td>
</tr>
<tr>
<td>Major debris:</td>
<td>10.6 m (ASTM F2656/F2656M-15) 12.1 m (IWA14-1:2013)</td>
</tr>
</tbody>
</table>

**Observations**

- Vehicle restrained: yes
- Vehicle immobilized: yes

**Penetration Rating ASTM:** P1 (1.7m)

**Performance Rating IWA14-1:** Blocker V/7200[N28]/64/90:12.1
### Technical Features

<table>
<thead>
<tr>
<th>Road blocker model</th>
<th>M30 (K4) AUIA-320-01</th>
<th>M40 (K8) AUIA-320-02</th>
<th>M50 (K12) AUIA-320-03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation type</td>
<td>submersible</td>
<td>submersible</td>
<td>submersible</td>
</tr>
<tr>
<td>Actuator type</td>
<td>hydraulic</td>
<td>hydraulic</td>
<td>hydraulic</td>
</tr>
<tr>
<td>Actuator location</td>
<td>external (internal)</td>
<td>external (internal)</td>
<td>external (internal)</td>
</tr>
<tr>
<td>Anticrossing platform</td>
<td>lift height, mm</td>
<td>lift height, mm</td>
<td>lift height, mm</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>Access blocking width, m</td>
<td>0,5</td>
<td>0,5</td>
<td>0,5</td>
</tr>
<tr>
<td>Overall dimensions, mm</td>
<td>1710x724x400</td>
<td>1910x724x500</td>
<td>2310x724x600</td>
</tr>
<tr>
<td>Maximum axle weight limit, t</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Material</td>
<td>structural steel</td>
<td>structural steel</td>
<td>structural steel</td>
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<tr>
<td>Penetration resistance, kJ</td>
<td>656</td>
<td>1110</td>
<td>1680</td>
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<tr>
<td>Raising time, s</td>
<td>5,5</td>
<td>5,6</td>
<td>6</td>
</tr>
<tr>
<td>Sinking time, s</td>
<td>3,28</td>
<td>3,4</td>
<td>3,58</td>
</tr>
<tr>
<td>Power supply</td>
<td>3-phase ~ 400V, 50/60Hz</td>
<td>3-phase ~ 400V, 50/60Hz</td>
<td>3-phase ~ 400V, 50/60Hz</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>0,8 kW for int. HU</td>
<td>1 kW for ext. HU</td>
<td>1,2 kW for ext. HU</td>
</tr>
<tr>
<td></td>
<td>1,6 kW for int. HU</td>
<td>2,2 kW for ext. HU</td>
<td>3 kW for ext. HU</td>
</tr>
<tr>
<td>Road blocker index of protection</td>
<td>IP 67</td>
<td>IP 67</td>
<td>IP 67</td>
</tr>
<tr>
<td>Noise pressure value</td>
<td>up to 85 dB</td>
<td>up to 85 dB</td>
<td>up to 85 dB</td>
</tr>
<tr>
<td>Control box index of protection</td>
<td>IP 54</td>
<td>IP 54</td>
<td>IP 54</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>710</td>
<td>790</td>
<td>920</td>
</tr>
<tr>
<td>Temperature conditions, °C</td>
<td>-10/-50</td>
<td>-10/-50</td>
<td>-10/-50</td>
</tr>
<tr>
<td>Temperature conditions with heating system (optional), °C</td>
<td>-30/-50</td>
<td>-30/-50</td>
<td>-30/-50</td>
</tr>
<tr>
<td>Light indication</td>
<td>built-in LEDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raised position locking</td>
<td>hydraulic unit</td>
<td>hydraulic lock</td>
<td></td>
</tr>
<tr>
<td>Manual emergency sinking</td>
<td>manual release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating mode</td>
<td>intensive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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• **Road Blocker dimensions K4 (M30) - AUIA-320-01**

• **Road Blocker dimensions K8 (M40) - AUIA-320-02**

• **Road Blocker dimensions K12 (M50) - AUIA-320-03**

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5. **Product Specification**

5.1 **Scope of Delivery**

Legend:
1. Road blocker assembly;
2. Control unit cabinet:
   a) Box with electric control unit (ECU).
   b) Hydraulic unit (HU);

Option 1
with external hydraulic unit

Option 2
with internal hydraulic unit

Legend:
1. Road blocker assembly;
   a) Box with electric control unit (ECU).
   b) Hydraulic unit (HU);

5.2 **Road Blocker major components.**

Legend:
1. Static part (frame);
2. Dynamic part (raising platform);
3. Hydraulic cylinder (HC);
4. Protective shutters;
5. Pivot mechanism;
6. Removable lid;
7. LED alarm lamp;
8. Hydraulic unit SEA Maxi 6*;
9. "Sockets" for eyebolt M16
10. Water discharge outlet

*To be delivered only in set with internal hydraulic unit. See Option 2.

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6. Road Blocker Installation

6.1 Arrangement of installation site:

-Arrangement of installation site must comply with requirements of applicable regulations and standards.
-Installation area shall be fenced along perimeter with temporary security fencing or caution tape at the distance of 3 meters from the installation site.
-The appropriate warning signs ISO 7010 shall be installed in front of the entrance to the installation site.

- Make sure that there are no underground utilities at the installation site!
- Keep outsiders away from the installation site!
- Safety regulations must be observed during installation!

6.2 Installation sequence:

- Preparation of installation pit;
- Arrangement of concrete base (foundation);
- Installation of utility conduit;
- Installation of road blocker in the designed position;
- Installation of hydraulic unit in the designed position**;
- Connection of utilities.

6.3 Installation procedure:

6.3.1 Preparation of installation pit:
1. The required marking according to the design solutions to be made;
2. The roadbed to be removed, if appropriate;
3. A pit to be dug (See dimensions in Table 1);
4. Geotextile to be put on the pit bottom;
5. The recommended water drain diagram is shown on page 16;
6. 50mm protective concrete layer to be poured (Concrete C30/37. ENV-206).
7. A ditch for installation of utilities of 600mm width and 400/500/600mm depth to be dug.

- Water discharge into the existing sewage system or earth to be provided, if applicable. Use of forced water discharge systems (pumps) is allowed.

- Concreting shall be performed according to the applicable standards;
- It is advised to use waterproof additives to obtain water-resistant concrete.

* in set with external hydraulic unit.
Table 1. Pit dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Standard</th>
<th>A, mm</th>
<th>B, mm</th>
<th>C, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU-IA-220-01</td>
<td>M30 (K4)</td>
<td>4200</td>
<td>1600</td>
<td>450</td>
</tr>
<tr>
<td>AU-IA-220-01</td>
<td>M40 (K8)</td>
<td>4200</td>
<td>1600</td>
<td>550</td>
</tr>
<tr>
<td>AU-IA-220-01</td>
<td>M50 (K12)</td>
<td>6500</td>
<td>1600</td>
<td>650</td>
</tr>
</tbody>
</table>

Vehicle traffic direction

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6.3.2 Preparation of installation pit. Reinforcing.

Reinforcement cage assembly. General appearance.

A. Road Blocker

B. Road Blocker and reinforcement cage assembly

For option A. Reinforcement cage is assembled on the installation site according to Annex 2.

- Road Blocker foundation installation design reference mark -400, -500, -600;
- Reinforcing shall be performed according to the applicable standards;
- Rebar shall be welded according to ISO 15614-7.

Reinforcement cage may be delivered as additional option along with the road blocker or can be manufactured by the site supervisor according to drawings of the company "TISO". The reinforcement cage drawing is shown in Annex 2 to this Manual.
Sequence of operations:

1. The product to be unpacked;
2. Outside condition and configuration of the road blocker to be checked;
3. Eye-bolts M16 to be installed;
4. The road blocker to be installed in the designed position by means of handling equipment.

Load dimensions:

1.5...2.8 m

• Road Blocker to be installed by means of handling equipment;
• Safety regulations must be observed according to the applicable standards during handling operations!
• Slinging must be performed by the properly qualified slingers having the appropriate permit to work;
• Presence of unauthorized persons at the installation site during handling operations is PROHIBITED!

Step 1
Connection of reinforcement cage with Road Blocker for Option A*

Every rib to be welded.

The whole structure of reinforcement cage and Road Blocker to be securely fixed (welded) to each other

* For Option B, page 13. Reinforcement cage is delivered with Road Blocker in assemble condition.
Step 2
The Road Blocker and reinforcement cage assembly to be dropped into the prepared pit.

The road blocker horizontal position according to compliance with the design reference marks shall be checked by means of leveling instrument. The roadbed level of the specified road section shall be taken as conventional +0.000.

Road Blocker in the designed position

Vehicle traffic direction
**Step 3**
Utility conduit tubes to be installed and fixed.

- **For cable and hydraulic hose output**

- **Used for water discharge into rainfall ditch or pit.**

- **Free ends of electric cables shall be packed tightly to prevent dirt, moisture and foreign particles penetration into them.**
Antiramming Road Blocker

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The Road Blocker top part to be protected with additional coating prior to concreting.

Step 4
400/500/600 mm concrete layer to be poured. Concrete shall be poured with the use of vibro shrinkage means.

Concreting shall be performed according to the applicable standards;
It is advised to use waterproof additives to obtain water-resistant concrete.

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After concrete is dry the road surface around the Road Blocker to be restored, the installation area (site) to be arranged and prepared for connection of the Road Blocker utilities and its trial performance.
Safety regulations to be observed during work.

Rear removable lids to be opened with screw M12 allen wrench to access to the Road Blocker utilities, hydraulic cylinders and hydraulic unit.

Eye-bolts to be unscrewed and removed and mounting holes to be plugged upon completion of installation.

* - See section "Road Blocker Wiring Diagram".
7. Connection of Road Blocker Utilities

- Make sure of the road blocker installation accuracy and attachment security prior to its connection.
- Take a close look at the hydraulic system and power supply connection diagrams as well as hydraulic unit and electronic control unit operation instructions.

7.1 Road Blocker connection to control unit

Control unit with built-in MINI hydraulic unit is a standalone and independent device, which is wall mounted on the protected area.

The Road Blocker control unit equipped with external hydraulic unit is located inside external hydraulic unit cabinet.

Control unit is connected to Road Blocker with electric control cable and protective earthing cable.

Electric cables between Road Blocker and control unit to be put in plastic corrugated tube or pipe.

1. High pressure hoses to be connected to hydraulic unit and hydraulic cylinders according to connection diagram (only in Road Blockers with external hydraulic unit);

2. Road Blocker to be connected to control unit is connected to with electric control cable and protective earthing cable;

3. 50 cm cable length margin from each side to be left to ensure remedial maintenance. Cable length margin to be folded inwards utility conduit;

4. The Road Blocker to be electrically connected and operated according to the guide "Road Blocker Wiring and Operation Manual of RB v1.2 RU series.doc".

Section 1.5. "Connection of the Road Blockers with capacity of 0,6 – 1,5 kW equipped with built-in 3-phase MINI hydraulic unit and putting them into operation", "Annex 3" and "Annex 4" to be used for the Road Blockers RB320-01-G-15-0.8/0.8, RB320-02-G-15-1.0/1.0, RB320-03-G-15-1.2/1.2.

Section 1.6. "Connection of the Road Blockers with capacity of 1,6 – 11 kW with external 1-phase or 3-phase hydraulic unit and putting them into operation", "Annex 5" and "Annex 6" to be used for the Road Blockers RB320-01-G-15-1.6/1.6, RB320-02-G-15-2.2/2.2, RB320-03-G-15-3.0/3.0.
The Road Blocker utilities must be connected when it is deenergized!
The relevant instructions should be strictly followed during connection!
The Road Blocker utilities must be connected only by the properly qualified professionals!

It is advised to put electrical cables in corrugated polyamide tube with waterproof sealed connectors to protect them against mechanical damage and environmental harmful impact.

* - Designed position is specified by individual design solutions.
- Control unit can be located within 25m from Road Blocker.
**Antiramming Road Blocker**

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**Revision 1.0**

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**Connection of Road Blocker with external hydraulic unit to control unit**

**Option No.1**

*with external hydraulic unit*

- Control unit can be located within **25m** from Road Blocker when external hydraulic unit is used and within **100m** when internal hydraulic unit is used.

* - Designed position is specified by individual design solutions.

---

**Connection of Road Blocker with internal hydraulic unit to control unit**

**Option No.2**

*with internal hydraulic unit*
7.2 Installation of induction loops

Installation of Road Blocker induction loops is defined by steps:

- Definition of loop geometry;
- Preparation of slot;
- Laying of wire;
- Asphalt or synthetic resin grouting;
- Check of induction loop detector function;

The use of induction loops and other motion detectors prevents actuation of Road Blocker when a vehicle is over it or in the vicinity specified by design.

The operation sequence specified in the guide to be followed.

Legend:

- Induction loop;
- Electric control unit;
- Road Blocker;
- Electric cable;
- Wire SiFF 1x1, Ø 2.7 mm
Definition of loop geometry

• Loops to be located within at least 15cm from metal objects;
• Loop installation depth to be 30mm-50mm from road surface;
• Loop to be made by means of one cable without any joints or shunts inside pit;
• Two cable ends going out of perimeter outline to be twisted or bound with each other;
• Loop shape to be rectangular;

Preparation of slot

• Deep slot to be prepared (width 5-10mm and depth 30-40mm);
• Loop slot shape to be rectangular;
• Corners to be cut at angle 45° to prevent failure of cable due to vibration of transit vehicles or possible subsidence of road surface;

Laying of wire

• Loop wire to be laid in slot as deep as possible;
• The number of loop turns and size to be selected from "Table 19 - Recommended sizes of loops and height of vehicle deduction over induction loop" of the document "Operation Manual. Part II. Wiring of the Road Blockers of RB series".
• Heat-resistant and extra-flexible wire SiFF 1x1 with outside diameter 2,7mm is recommended for loop laying;
• Led to loop wire to be twisted at least 8 times per meter and to be put in slot or plastic pipe;

Asphalt or synthetic resin grouting

• Asphalt or synthetic resin can be used as potting material. Temperature should not exceed loop isolating value during pouring (Permissible temperature limit for Heat-resistant and extra-flexible wire SiFF is -60°C to +180°C).

The relevant signs to be installed in the traffic area controlled by Road Blockers.
8. Precommissioning

8.1 Preparation for precommissioning:

- Compliance and reliability of the road blocker, hydraulic unit and control unit electrical cable connections to be checked;
- The roadbed around road blocker to be restored;
- The equipment power network to be checked;
- Reliability of connection with earth loop to be checked.

8.2 Precommissioning:

- Hydraulic unit and control unit to be energized;
- Road blocker trial operation to be conducted;

The following shall be checked while conducting trial operation:

1. Hydraulic unit operation parameters;
2. Control unit and remote control panel operation parameters;
3. Road blocker operation parameters.

- The required equipment performance parameter setting to be set, if appropriate.
- Oil to be refilled after hydraulic unit is actuated and air is removed from hydraulic cylinders;
- If a fault is detected it is necessary to trace the trouble and remedy it, if applicable*.
  (* - See Table 1).

Commissioning, equipment adjustment, troubleshooting shall be performed only by the properly qualified professionals!

Safety regulations should be strictly observed during commissioning and equipment adjustment!

It is forbidden:

1. to prevent raising/sinking of road blocker platform;
2. to touch the road blocker's moving parts during its operation;
3. to initiate movement of vehicles prior to complete sinking of the road blocker's barrage elements.

The area adjacent to road blocker shall be free and clear of foreign items.
9.2.1 The road blocker maintenance includes preventive measures to be taken according to the established frequency to maintain the road blocker in operational condition, decrease component wearing and prevent faults and malfunctions.

<table>
<thead>
<tr>
<th>Table 1. Road Blocker Fault Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptom</strong></td>
</tr>
</tbody>
</table>
| Barrage platform is raising by fits and starts | 1. There are foreign particles in guiding grooves.  
2. Shaft seizure.  
3. Cylinder is jammed. | 1. Guides to be cleaned and shafts to be lubricated.  
2. Cylinder condition to be checked and replaced, if appropriate. |                                               |
| Incomplete raising and sinking of platform | There are foreign particles in guiding grooves. | Guides to be checked and cleaned.  
Shafts to be lubricated. |                                               |
| Actuation of hydraulic unit is far too often | 1. Oil leakage.  
2. Air inleakage. | 1. Hydraulic connections to be checked.  
2. Air to be evacuated from hydraulic system |                                               |
| Operation noise | 1. High-viscosity hydraulic fluid.  
2. Pump is worn out.  
3. Air inleakage. | 1. Oil to be changed.  
2. Pump to be replaced.  
3. Air to be evacuated from hydraulic system |                                               |
| Excessive heating of hydraulic fluid | 1. Contamination of hydraulic system.  
2. Continuous operation. | 1. Hydraulic system to be cleaned.  
2. Operation conditions to be observed according to the datasheet. |                                               |
| Incomplete raising of platform | 1. Oil low level | 1. Oil level to be checked and filled up to the required level |                                               |

9. **Road Blocker Operation Regulations**

9.1 To ensure the road blocker continuous and reliable operation it is necessary:

- to use the road blocker according to its intended purpose;
- all rules specified in this Manual shall be strictly observed during operation;
- to provide maintenance and repair of equipment in due time;
- to prevent the road blocker operation and maintenance to be performed by unauthorized persons;

9.2 Equipment Maintenance:

9.2.1 The road blocker maintenance includes preventive measures to be taken according to the established frequency to maintain the road blocker in operational condition, decrease component wearing and prevent faults and malfunctions.
Equipment examination and maintenance shall be performed according to Schedule* and only by properly qualified professionals.

* See Table 2.

9.2.2 Recommended types of the road blocker maintenance (M):
- Daily inspection (each shift);
- M-1 (monthly);
- M-2 (semiannually);
- M-3 (annually);
- Major repair (MR) – after 20000 cycles.

Table 2. Road Blocker maintenance schedule

<table>
<thead>
<tr>
<th>M type</th>
<th>Frequency</th>
<th>Scope of control/work</th>
</tr>
</thead>
</table>
| Daily inspection | each shift | Normally the daily maintenance is performed before commencement of work and includes visual inspection of the road blocker and, if required, prompt mechanical troubleshooting, elimination of corrosion and surface pollution. The following control shall be conducted during daily maintenance: 
  - availability of all units and sensors in their proper locations and their fastening security;
  - performance of all sensors and cable integrity;
  - road blocker normal operation without jerks and abnormal noises, jamming of movable constructional elements;
  - motor heating (over 70°C). |
| M-1 | monthly | M-1 is performed monthly and includes the following measures: 
  - measures in the scope of daily inspection;
  - elimination of dust from the road blocker housing and components;
  - cleaning of actuators, sensors and drive;
  - verification of sensors fixation reliability and their performance;
  - verification of good condition and fastening security of cable connections to actuators, sensors;
  - check of availability and integrity of protective fences and devices. |
| M-2 | semiannually | M-2 maintenance is performed semiannually including the following types of work: 
  - measures in the scope of M-1;
  - verification of fastening security of units and devices. |
| M-3 | annually | M-3 maintenance is performed annually including the following types of work: 
  - measures in the scope of M-2;
  - check of status of bearings, sealing cups and lubrication;
  - blowing and cleaning of terminal boxes;
  - tensioning of screw joints of terminal boxes;
  - check of reliability and quality of cable connections and earthing;
  - check of insulation resistance;
  - repair of paint coatings. |
The hydraulic unit maintenance shall be performed according to the guidelines specified in the hydraulic unit instruction manuals, combining them with M-2 or M-3.

Major repair is recommended to be performed by the manufacturer or dedicated repair service according to the manufacturer’s documentation with the use of the manufacturer’s spare parts as well as restored or manufactured by special repair facilities according to the manufacturer’s documentation.

Mean lifetime between major repair is at least 20000 hours.

- The time of maintenance and major repair can be increased or decreased depending on actual parameters of the road blocker operation and fixed by the company operating this equipment.

- All types of maintenance should be recorded in maintenance and repair work sheet.

9.3 Safety regulations:
The appropriate safety measures shall be observed during operation and maintenance of the road blocker.

9.3.1 IT IS FORBIDDEN TO USE DEFECTIVE APPLIANCES, TOOLS, INSTRUMENTATION THE SERVICE LIFE OF WHICH EXPIRED.

9.3.2 Installation and operation of electrical equipment should be performed at the factory according to the Regulations for Operation of Consumer Electrical Installations, Safety Rules for Operation of Customers' Electrical Installations complied with the Occupational Safety Standards System (GOST 12.3.003, GOST 12.3.019 and GOST 12.3.032).

9.3.3 The road blocker must be repaired by the persons being over 18, having at least level III of electrical safety qualification, relevant permit to work with electrical facilities up to 1000V, be safety briefed at workplace and scrutinized the product instruction manuals.

9.3.4 It shall be the responsibility of the owner to ensure safety measures.

9.3.5 Hazardous characteristics during the road blocker operation are:

- mechanical impact of raising/sinking dynamic part;

- electric shock by 220V/380V.
9.3.6 Service and repair shall be performed only when equipment is deenergized, a forbidding safety sign according to ISO 7010 with notation “DO NOT SWITCH ON MEN WORKING!” is put on initiator. After completion of works safety signs should be removed and equipment should be actuated only upon authorization of the work superintendent.

Road Blocker is deenergized by switch \( K1 \) (S1) in control unit cabinet.

9.3.7 The Road Blocker electrical equipment should be earthed. Resistance between earthing bus and each accessible metal non-current-carrying part of the road blocker electrical equipment housing should not exceed 4 Ohm.

9.3.8 It is forbidden:
- to perform maintenance and repair works when the road blocker electrical equipment is energized;
- to perform maintenance and repair works when equipment is in operation.

9.3.9 The regulations specified in the documents listed below should be observed when using the Road Blocker:

- "Regulations for Operation of Consumer Electrical Installations";
- "Interbranch rules on labor safety during operation of electricity generating equipment";
- "Electrical Installations Code";

9.3.10 General safety requirements accepted in the particular company should be in effect during installation and operation of the road blocker. The safety requirements should be observed during preservation and depreservation.

9.3.11 Fire safety regulations should be observed when paraffin oil for rinsing of units and parts is used.

9.3.12 The safety instructions specified in instruction manuals for purchased products and control system should be additionally governed by.

9.3.13 The Road Blocker operating in conjunction with other technological equipment should have common locking with it.
It is strictly forbidden:

- to allow the persons being unfamiliar with operation and safety rules to service the road blocker;
- to operate the road blocker unearthed;
- to touch current carrying elements;
- to touch movable parts of the road blocker during operation;
- to operate the road blocker when protective devices and switches are removed;
- to prevent the road blocker raising and sinking;
- to use metalwork of the road blocker for connection of neutral wire of electric welder;
- to perform welding works near the road blocker without noncombustible material protection to avoid its burning.

Important!

- Prior to operation of the road blocker make sure that all units providing safety of works are in good condition and properly installed;
- Take into account that the Tyre Killer could be damaged during transportation;
- Don’t disconnect the elements providing safety of works and don’t try to modify them;
- In case of any faults or defects, inform the person in charge of the product service.

10. Warranty Liabilities

- The warranty period is 1 year.
- The warranty period is effective from the date of road blocker sale.
- The warranty is valid only subject to compliance with operation regulations and safety measures.
- The warranty repair shall not be performed in the following cases:
  - expiration of the warranty period;
  - improper operation;
  - the product bears the traces of tampering or attempt of unauthorized repair;
  - damage resulted from the use of inappropriate accessories;
  - damage caused by environment;
  - damage resulted from the use of nonstandard or incompatible equipment;
  - damage caused by exceeding of maximum permissible loads.

In all cases, when the product is not subject to warranty repair, a paid repair may be considered.

Warranty repair shall be performed upon availability:

- Product datasheet;
- Warranty coupon with stamped date of sale.
11. Road Blocker Hydraulic System

The Road Blocker hydraulic actuation is provided by two hydraulic units: external and internal.

11.1 External hydraulic unit.

11.1.1 Basic Technical Features of External hydraulic unit.

<table>
<thead>
<tr>
<th>for class K4 Road Blocker (M30)</th>
<th>AUIA-320-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pump capacity, l/min</td>
<td>8</td>
</tr>
<tr>
<td>Operating pressure, MPa</td>
<td>4,6</td>
</tr>
<tr>
<td>Pump</td>
<td></td>
</tr>
<tr>
<td>Motor capacity, kW</td>
<td>0,8</td>
</tr>
<tr>
<td>Shaft speed, rpm</td>
<td>2750</td>
</tr>
<tr>
<td>Alternate current, V</td>
<td>380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>for class K8 Road Blocker (M40)</th>
<th>AUIA-320-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pump capacity, l/min</td>
<td>9</td>
</tr>
<tr>
<td>Operating pressure, MPa</td>
<td>5,3</td>
</tr>
<tr>
<td>Pump</td>
<td></td>
</tr>
<tr>
<td>Motor capacity, kW</td>
<td>2,2</td>
</tr>
<tr>
<td>Shaft speed, rpm</td>
<td>2750</td>
</tr>
<tr>
<td>Alternate current, V</td>
<td>380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>for class K12 Road Blocker (M50)</th>
<th>AUIA-320-03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pump capacity, l/min</td>
<td>10</td>
</tr>
<tr>
<td>Operating pressure, MPa</td>
<td>5,3</td>
</tr>
<tr>
<td>Pump</td>
<td></td>
</tr>
<tr>
<td>Motor capacity, kW</td>
<td>3</td>
</tr>
<tr>
<td>Shaft speed, rpm</td>
<td>2750</td>
</tr>
<tr>
<td>Alternate current, V</td>
<td>380</td>
</tr>
</tbody>
</table>
11.1.2 Layout of internal hydraulic unit

Hydraulic fluid Shell TELLUS S 46 is recommended.

1SNDN12 high pressure hoses are used for connection of the Road Blocker hydraulic unit cylinders.

<table>
<thead>
<tr>
<th>Code</th>
<th>NW</th>
<th>Inner ø (mm)</th>
<th>Reinforced ø (mm)</th>
<th>Outer ø (mm)</th>
<th>Operation pressure (bar)</th>
<th>Min. burst pressure (bar)</th>
<th>Min. bending radius (mm)</th>
<th>Weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SNDN12</td>
<td>12</td>
<td>12.7</td>
<td>18.3</td>
<td>21</td>
<td>215</td>
<td>640</td>
<td>180</td>
<td>0.41</td>
</tr>
</tbody>
</table>
11.1.3 **Hydraulic Diagram for AUIA-320 with internal hydraulic unit**

![Hydraulic Diagram for AUIA-320 with internal hydraulic unit](image-url)

- **ГЦ** - гидроцилиндр;
- **Кр1, Кр2, Кр3** - кран;
- **Г3** - гидрораспределитель;
- **Р31** - распределитель 4/3;
- **Р32** - распределитель 2/2;
- **Мн** - манометр;
- **КП** - клапан предохранительный;
- **М** - электродвигатель;
- **РН** - насос ручной;
- **АК** - аккумулятор пневмогидравлический;
- **РД** - реле давления;
- **КО1, КО3** - обратный клапан;
- **Н** - насос;
- **НС** - насосная станция;
- **Б** - гидробак;
- **ФВ** - фильтр всасывающий;
- **ФС** - фильтр сливающей
### 11.2 Internal hydraulic unit

#### 11.2.1 Basic technical specifications of built-in hydraulic unit  SEA Maxi-6

**SEA Maxi-6 basic technical specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pump capacity</td>
<td>l/min</td>
<td>6</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>MPa</td>
<td>13</td>
</tr>
<tr>
<td>Shaft speed</td>
<td>rpm</td>
<td>2800</td>
</tr>
<tr>
<td>Alternate current</td>
<td>V</td>
<td>400</td>
</tr>
<tr>
<td>Motor capacity</td>
<td>kW</td>
<td>0.8 / 1.0 / 1.2</td>
</tr>
</tbody>
</table>

---

**Recommended hydraulic unit fluid:** SEA-OX29

---

**Hydraulic Unit SEA MAXI-6**

- **Grey Screw** for force adjustment
  - Exit 1
- **Yellow Screw** for force adjustment
  - Exit 2

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**Motor cable**
- Blue = Common
- Black = Opening/Closing + Capacitor
- Brown = Closing/Opening + Capacitor
- Yellow/Green = Ground

**Oil refilling cap**

**Oil level**

---

675 mm
11.2.2 Layout of external hydraulic unit

HC 63-40-180
(Piston diameter 63 mm,
Rod diameter 40 mm,
Stroke 180 mm)

11.2.3 Hydraulic Diagram for AUIA-320 with external hydraulic unit

Legend:

M - Motor;
H - Pump;
Г3 - Hydraulic lock;
P3 - Distributor;
КП - Safety valve
KO - Inverted valve;
ΦВ - Filter;
ГЦ1 - Hydraulic cylinder;
ΦВ - Discharge filter.
11.3 Road Blocker manual release

It is used in case of power failure for forced sinking of dynamic part (raising platform).

11.3.1 Manual release diagram