



Caspian Pipeline Consortium

CPC INSTRUCTION # 103
ELECTRICAL EQUIPMENT LOCK OUT / TAG OUT
VERSION 2.0.

Effective date: 31.10.2013

Resolution: CPC-R No. ДФ-147/13-P dd. 24.09.2013

CPC-K No. ДФ-49/13-K dd. 24.09.2013

Moscow, 2013

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INTRODUCTION

This Instruction establishes the main requirements that must be followed for arrangement of safe performance of electrical equipment locking and tagging when work on electrical plants are carried out at the facilities of Caspian Pipeline Consortium-R and Caspian Pipeline Consortium-K (“CPC”).

Note: Instruction # 102 establishes the main requirements for safe isolation of mechanical equipment and process piping. Thus, when switching off, for instance, electric power supply of electrically driven pumps, both Instructions must be followed.

1. GENERAL

1.1. The purpose of this Instruction is to establish unified requirements to the process of preparation, performance and completion of locking and tagging work at CPC facilities. Potentially hazardous energy sources (*i.e.* electric power, steam, air, oil, hot water, liquid hydrocarbons, and natural gas) must be disconnected or isolated and precautions must be taken to prevent loose or movable parts from rotating or otherwise moving and becoming a hazard.

1.2. The requirements hereof shall apply to locking and tagging work carried out by personnel of CPC and its contractors performing certain types of work on the operating electrical plants.

2. LOCK OUT OF EQUIPMENT

2.1 Purpose of Locks

2.1.1 Locks should be used for preventing erroneous or spontaneous actuation of switching devices to ensure that a piece of equipment cannot be operated or supplied with power while work is being performed.

2.2 Usage and Custody of Locks

2.2.1 Operations locks will be kept in lock boxes at workplaces of the personnel involved in operation and maintenance of electrical plants. The Site Supervisor will maintain a spare supply of locks and tags. Operating personnel shall register installation of all locks in the log book entitled “Locks Installed and Returned”. Locks will be uniquely numbered for tracking and control. Each lock issued should be recorded in the log in a separate line.

2.2.2 Red color padlocks with individual keys will be used for work activities on electrical equipment. The keys should be numbered. It is required to have one spare key set. All keys shall be kept in a locked box.

2.2.3 The Operations lock is always the first to be installed and the last to be removed.

2.2.4 After a piece of equipment has been locked out, Operations must try to start the equipment to confirm that the equipment is correctly de-energized.

2.2.5 Additional Maintenance locks shall be installed by personnel including contractors and subcontractors who will be performing work on the equipment. All of these

Maintenance locks must be removed and confirmation that no one is still working on the equipment must be made before the final Operations lock is removed and the equipment is placed back in service.

2.3 Restrictions

2.3.1 The lock keys and removable locking device handles should be controlled by the Operations field personnel during the entire work performance period or handed over to the relieving shift member, which calls for an explanation as regards where and why the locks were installed and documenting handover of the keys by making a respective record in the operations log.

2.3.2 After the work shift end the performers of the work should hand over the keys to the Maintenance locks installed to the operating personnel, such fact to be documented by making a respective record in the operations log. Such keys should be kept in a locked box. Location of the locks should be controlled by the operating personnel and documented by making a respective record during the shift changeover. Before resuming work, the performers of the work should retrieve their key(s) to the Maintenance locks from Operations field personnel and confirm that their Maintenance locks are still in place.

2.3.3 Locks and tags may only be removed by the person who installed them or such person's respective relief. The person who removes the lock assumes responsibility for the equipment and for safety of anyone who may be working on it.

2.3.4 Under normal circumstances, Operations personnel should never remove a Maintenance lock. If an emergency situation arises where Operations must remove a Maintenance lock, only the PS Manager or his deputy (alternate) may order to remove the lock and the reasons must be clearly documented in the logbook.

2.3.5 Only if an energy-isolating device is not capable of being locked out may tag out be used instead of lock out. For the avoidance of energizing the workplace, prohibitive tags "DO NOT SWITCH ON! MEN AT WORK" must be placed on the drives (drive handles) of the manually operated switching devices. *Use of a tag instead of a lock is a much less safe means of isolation. If a piece of equipment is not capable of be locked out, it should be documented and a MOC initiated to design a way to lock out the equipment or replace it.*

3. PURPOSE OF SAFETY TAGS

Safety tags and signs are intended for the following:

- Prohibition of operations with switching devices that may be erroneously switched on thus energizing a working area (prohibitive tags);
- Warning of a danger of approaching energized conductive parts and walking with no protective means in an open switchgear of 330 kV capacity and higher having an electric field intensity exceeding the allowable one (warning signs and tags);
- Permission of specific operations only upon fulfillment of certain safety requirements (prescriptive tags); and
- Indication of impermissibility of energizing an electric plant grounded area (directive tag).

4. SEQUENCE OF OPERATIONS DURING PREPARATION OF A WORK AREA, LOCK OUT AND TAG OUT

4.1 Removal of 10 kV electrical equipment, cable line (OHL) from service for repair (work is performed outside the switchgear/control gear)

4.1.1 Switch off 10 kV switch.

4.1.2 Check the switched off position of the switch based on the standard indicator of drive position and the lack of indication on the stationary detectors of the switchgear/control gear cell voltage.

4.1.3 Switch off the “Drive Power Circuit” and “Operational Circuits Power Supply” circuit breakers in the switchgear/control gear relay compartment and place “DO NOT SWITCH ON! MEN AT WORK” tag.

4.1.4 Put the roll out element of 10 kV switchgear/control gear cell to the control position.

4.1.5 Switch off the connector of the operational circuits, signal circuits, and supply circuits of the roll out element drive.

4.1.6 Roll out the switch, remove it from the cabinet and place on a cart.

4.1.7 Lock the shutters or doors of the switchgear/control gear switch compartment with an Operations padlock (this operation should be performed by the work permit issuer).

4.1.8 Lock the shutters or doors of the switchgear/control gear switch compartment with the Maintenance padlock(s) (this operation should be performed by the person(s) performing the work under a separate work permit or, on the instruction of the same, by the work permit issuer).

4.1.9 Place the tag “DO NOT SWITCH ON! MEN AT WORK” or “DO NOT SWITCH ON! WORK ON THE LINE IS UNDERWAY” on the roll in prohibition switch.

4.1.10 Check that there is no voltage.

4.1.11 Switch on the grounding blades of the switchgear/control gear cell.

4.1.12 Place the directive tag “GROUNDED”.

4.1.13 Try to start the equipment that is to be worked on to confirm that it is de-energized.

4.2 Removal from service for repair with the view of working on the switch or in 10 kV switchgear/control gear compartments

4.2.1 Switch off 10 kV switch.

- 4.2.2 Check the switched off position of the switch based on a standard indicator of drive position and lack of a voltage indication in the switchgear/control gear cell by stationary detectors.
 - 4.2.3 Switch off the “Drive Power Circuit” and “Operational Circuits Power Supply” circuit breakers in the switchgear/control gear relay compartment and place “DO NOT SWITCH ON! MEN AT WORK” tag.
 - 4.2.4 Put the roll out element of 10 kV switchgear/control gear cell to the control position.
 - 4.2.5 Switch off the connector of the operational circuits, signal circuits, and supply circuits of the roll out element drive and remove the switch from the high voltage compartment of the switchgear/control gear cabinet by placing the roll out element on the repair cart.
 - 4.2.6 Lock the shutters of the compartment of the switchgear/control gear cell roll out element with an Operations padlock and place the warning tag “KEEP OUT! HIGH VOLTAGE” (this operation should be performed by the work permit issuer).
 - 4.2.7 Lock the shutters or doors of the switchgear/control gear switch compartment with the Maintenance padlock(s) (this operation should be performed by the person performing the work or, on the instruction of the same, by the work permit issuer).
 - 4.2.8 Place the tag “DO NOT SWITCH ON! MEN AT WORK” on the roll in prohibition switch.
 - 4.2.9 Check that there is no voltage.
 - 4.2.10 Switch on grounding blades of the switchgear/control gear cell.
 - 4.2.11 Place the directive tag “GROUNDED”.
 - 4.2.12 Place directive tags “WORK HERE!” on the switch roll out element and the compartment where the work should be performed.
 - 4.2.13 During the work on the switch, the switching springs of 10 kV EGV must be put into nonoperating position (discharged).
- 4.3 Removal of 0.4 kV switchboard panel electric equipment from service for repair (panel boards with roll out elements)
 - 4.3.1 Switch off the circuit breaker of the 0.4 kV connector.
 - 4.3.2 Put the roll out element of the 0.4 kV switchboard panel cell to the repair position.
 - 4.3.3 Put the Operations padlock on the switch of prohibition of roll in of the 0.4 kV switchboard panel cell roll out element (this operation should be performed by the work permit issuer).

Put the Maintenance padlock(s) on the switch of prohibition of roll in of the 0.4 kV switchboard panel cell roll out element (this operation should be performed by the person performing the work or, on the instruction of the same, by the work permit issuer).

4.3.4 Place the tag “DO NOT SWITCH ON! MEN AT WORK” on the roll in prohibition switch.

4.4 Removal from service of the automatic distribution station electric equipment with K-112 cells of the along the route 10 kV OHL or reclosers for repair

4.4.1 Switch off 10 kV vacuum circuit breaker (recloser).

4.4.2 Check the switched off position of 10 kV vacuum circuit breaker based on the light indication on the signalization panel of the K-112 automatic distribution station control cabinet or indication of the high voltage recloser block and recloser control cabinet screen.

4.4.3 Switch off the circuit breakers “Power Supply of Operational Circuits from 10/0.22 kV VT” and “Power Supply of Operational Circuits from the MLBV Site Invertor” in the K-112 automatic distribution station control cabinet. Place the prohibitive tag “DO NOT SWITCH ON! MEN AT WORK”.

4.4.4 Switch off the main blades of the line disconnectors with the visual control of exit of all blades and formation of a visible electrical open.

4.4.5 Put the Maintenance padlocks on the drives of the disconnectors’ main blades in addition to the blocking padlocks (this operation should be performed by the work permit issuer).

4.4.6 Place the prohibitive tags “DO NOT SWITCH ON! WORK ON THE LINE IS UNDERWAY” on the drives of the disconnectors’ main blades.

4.4.7 Check that there is no voltage at K-112 automatic distribution station (recloser) using UVN-10 high voltage indicator.

4.4.8 Switch on grounding blades of the line disconnectors of K-112 automatic distribution station. If grounding blades of the automatic distribution station with recloser are lacking, install temporary grounds on two sides.

4.4.9 Place the directive tags “GROUNDED” on the drives of the disconnectors.

4.4.10 Place the prescriptive tag “WORK HERE!” on the control cabinet and high voltage compartment of K-112 automatic distribution station (recloser).

4.4.11 Fence the working area and ensure safe climb to the high voltage compartment of K-112 automatic distribution station (recloser). Indicate the place for safe climb with the prescriptive tag “CLIMB HERE”.

- 4.5 Repair of the motors capable of rotating due to mechanisms
- 4.5.1 Before granting permit to working on electric motors capable of rotating due to mechanisms connected with them, hand wheels of the block valves (gate valves, valves, slide valves, *etc.*) must be locked. The required block valve operations must be performed with the account of the requirements set forth in Instruction # 102, making a respective record in the operations log.
- 4.6 Repair of the valve motors
- 4.6.1 Circuits of manual, remote, and automatic control of the block valve electric drives and guiding devices must be deenergized and locked out. The hand wheels of gate valves, slide valves, and other valves must be locked out with Operations padlocks (chain or steel cable may be needed) and tags “DO NOT OPEN! MEN AT WORK” must be hung on; and tags “DO NOT SWITCH ON! MEN AT WORK” must be placed on the keys and control buttons of the block valve electric drives.
- 4.7 Removal from service of electric motor of 10 kV mainline pump unit for repair
- 4.7.1 Switch off the switch of 10 kV cell of the mainline pump unit electric motor.
- 4.7.2 Check the switched off position of 10 kV switch based on the standard indicator of drive position and the lack of indication on the stationary detectors of the switchgear/control gear cell voltage.
- 4.7.3 Switch off the “Drive Power Circuit”, “Operational Circuits Power Supply” and “VT Circuits” circuit breakers in the switchgear/control gear relay compartment and place “DO NOT SWITCH ON! MEN AT WORK” tag.
- 4.7.4 Switch off the connector of the operational circuits, signal circuits, and supply circuits of the roll out element drive.
- 4.7.5 Put the roll out element of 10 kV switchgear/control gear cell of the required mainline pump unit electric motor in the repair position (remove the switch from the high voltage compartment of the switchgear/control gear cabinet by placing the roll out element on the repair cart).
- 4.7.6 Lock the shutters of the compartment of 10 kV switchgear/control gear cell roll out element with an Operations padlock and place the prohibitive tag “DO NOT SWITCH ON! MEN AT WORK” (this operation should be performed by the work permit issuer).
- 4.7.7 Lock the shutters or doors of the switchgear/control gear switch compartment with the Maintenance padlock(s) (this operation should be performed by the person performing the work under a separate work permit or, on the instruction of the same, by the work permit issuer).
- 4.7.8 Check that there is no voltage in the switchgear/control gear cell.
- 4.7.9 Switch on the grounding blades of the switchgear/control gear cell.
- 4.7.10 Place the directive tag “GROUNDED”.

4.8 Repair of electric motors soft starter

4.8.1 Removal from service of electric motors soft starter for repair in compliance with the requirements set for in the Instruction "OPERATION OF SOFT STARTER FOR HIGH VOLTAGE ELECTRIC MOTOR OF UBPVD – VTs – 10 – 630 TYPE".

4.8.2 Switch off and put in repair position circuit breakers of cells of 0.4 kV power supply of electric motors of main line block valves (inlet, outlet) of the respective mainline pump unit.

4.8.3 Put Operations padlocks on the switches of prohibition of roll in of the roll out elements of cells of 0.4 kV power supply of electric motors of main line block valves (inlet, outlet) of the respective mainline pump unit.

4.8.4 Place the tags "DO NOT SWITCH ON! MEN AT WORK" on the switches of prohibition of roll in of cells of 0.4 kV power supply of electric motors of main line block valves (inlet, outlet) of the respective mainline pump unit.

4.8.5 Switch off and put in repair position circuit breakers of cells of 0.4 kV power supply of electric motors of pressurization fans of the respective mainline pump unit.

4.8.6 Put Operations padlocks on the switches of prohibition of roll in of the roll out elements of cells of 0.4 kV power supply of electric pressurization fans of the respective mainline pump unit.

4.8.7 Place the tags "DO NOT SWITCH ON! MEN AT WORK" on the switches of prohibition of roll in of cells of 0.4 kV power supply of electric motors of pressurization fans of the respective mainline pump unit.

4.8.8 Put Operations padlocks on the mainline block valve hand wheels in compliance with the requirements set forth in CPC Instruction # 102 "Mechanical/Process Equipment and Piping Isolation".

4.8.9 Fence the working area ensuring safe passage to the electric motor of the respective mainline pump unit; put the prohibitive tag "KEEP OUT! HIGH VOLTAGE" on the fence and prescriptive tags "WORK HERE" on the electric motor.

4.8.10 When working on bearing assemblies of an electric motor of a respective mainline pump unit, shut off oil inlet to the bearings using the process block valves. Put Operations padlocks on the block valve hand wheels in compliance with the requirements set forth in CPC Instruction # 102 "Mechanical/Process Equipment and Piping Isolation".

4.9 After completion of the log out and tag out of electrical equipment removed from service, the work permit issuer must try to switch on the equipment to make sure that it will not start.

4.10. When working outside of the switchgear on the equipment connected thereto or on the

overhead or cable power lines it is allowed, instead of rolling the switch on a repair cart and locking the switch compartment, to roll out the switch into the control position, disengage the grounding knives and put an Operations padlock and Maintenance padlock on the switch roll blocking devices.

5. REMOVAL OF LOCKS AND TAGS UPON THE WORK COMPLETION

5.1 Operations locks and warning tags must remain in place until all work has been completed, including removal of blinds, reinstallation of the spools, and reconnection of the lines.

Note: If mechanical or electrical work is to continue into another shift, all locks and tags must remain on the equipment.

5.2 Under normal circumstances, the person installing a lock and a safety tag will remove them making a respective record in the operations log. However, operating personnel may remove locks and safety tags installed during preparation of the work area complying with the requirements set forth in Chapter 2.12 of the Inter-Industry Labor Protection Rules (Safety Rules) for Operation of Power Units, POT RM 016-2001 RD 153-34.0-03.150-00.

6. DOCUMENTS USED FOR DEVELOPMENT OF THIS INSTRUCTION

#	Document Title	Approval by Authorities
6.1	Instruction for Applying and Testing Protective Means Used in Electrical Installations SO 153-34.03.603-2003.	Approved by Minenergo Resolution # 261 of 30.06.2003
6.2	Inter-Industry Labor Protection Rules (Safety Rules) for Operation of Power Units. POT RM – 016-2001 RD 153-34.0-03.150-00	Endorsed by Gosenergonadzor, Minenergo of Russia, on 22.12.2000
6.3	Power Plant Operation Rules	Approved by Minenergo Resolution # 6 of 13.01.2003
6.4	“Mechanical/Process Equipment and Piping Isolation”	Resolution on putting Instruction # 102 into effect.

Attachment 1. Locks Installed and Returned

Date & time	Place (dispatch name)	Installation						Removal					
		Operating personnel's locks		Locks of the work performer		Date & time	Operating personnel		Work performer				
		Lock #	Person's name	Signature	Lock #		Person's name	Signature	Person's name	Signature			

Attachment 2. List of Revisions

Rev. #	Numbers of pages				Total number of pages in the document	Change notification #	Name, signature	Date	Introduction period
	Changed	Replaced	New	Deleted					