

Mechanical Securing of Equipment

(2nd Level of TMS Documentation)

(5th Issue)

Approved by: Mrs. Anna Wydrzyńska - Chief Executive Officer

Developed by: HSQ Department

Documentation custodian: Technician of Organization and Control

Issued on: 5.6.2015

Valid from: 6.6.2015

Copy no.:

This document is confidential. Neither the whole, nor any part of this document may be disclosed to any third party without the prior written consent of ČESKÁ RAFINÉRSKÁ, a.s.

Directive no. 407 “Mechanical Securing of Equipment”

Changes summary

Change no.	Page number		Subject of the change	Date	Signature
	removed	inserted			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Document history and control

Date	Reason for update	Author (name)	Approved by (name and signature)
July 1998	1 st issue	Work Safety Section	Ing. Ivan Ottis Chief Executive Officer
November 2006	2 nd issue	Miloš Maršíček	Ing. Ivan Souček Chief Executive Officer
July 2010	3 rd issue	Miloš Maršíček	Ing. Ivan Souček, Ph.D. Chief Executive Officer
May 2013	4 th issue	Miroslav Holienčín	Mr. Leszek J. Stokłosa Chief Executive Officer
May 2015	5 th issue	Jitka Kopecká	----- Mrs. Anna Wydrzyńska Chief Executive Officer

Directive no. 407 “Mechanical Securing of Equipment”**Table of contents**

Changes summary	2
Document history and control	2
Table of contents	3
1. Introduction	4
1.1 Purpose	4
1.2 Scope of validity	4
2. Abbreviations, terms, definitions	5
3. Mechanical securing of equipment	5
4. Rules for mechanical securing of equipment	6
5. Examples of securing	8
5.1 Dismantling pipeline bundles of heat exchangers	8
5.2 Dismantling a whole set of pipeline bundles of heat exchangers	8
5.3 Dismantling a pump	8
5.4 Shutting down a furnace	8
6. Related documentation	9
6.1 Internal documentation	9
7. Separate appendices	9

Directive no. 407 “Mechanical Securing of Equipment”**1. Introduction****1.1 Purpose**

- To ensure the health of employees of the Company and of other organizations is not jeopardized during the work on the equipment,
- To ensure that hydrocarbons, hazardous liquids and gases do not get into the equipment, which
 - a) is temporarily out of operation,
 - b) has been shutdown or open,
 - c) is a part of maintenance and investment work.
- To ensure that hydrocarbons and hazardous substances do not get into not controlled parts of the equipment or to its surroundings.

1.2 Scope of validity

This regulation is binding for all employees of the Company and to employees of other organizations who work within the premises and on equipment, which is the property of or administered by the **Company**.

The directive is not intended for dealing with situations related to entering and working in confined spaces and below the ground level, for which there is a directive no. 408 “Safeguarding of Entry and Work in Confined Spaces and below the Ground Level”.

Directive no. 407 “Mechanical Securing of Equipment”
2. Abbreviations, terms, definitions

Abbreviation / Term / Definition	Explanation / Meaning
Company	ČESKÁ RAFINÉRSKÁ, a.s.
Operational documents	Operational documentation including the following internal and external documents: Internal documents: <ul style="list-style-type: none"> - Operators manual (K+L¹) - Work instruction (K²) - Operational regulation (L³) - Local operational regulation (L) - Local regulation (L) - Handling regulation (L) - Basic operational regulation (L) - Emergency regulation (L) - Work procedure (K) - Documentation on protection against explosion – DOPV (K+L) External documents: <ul style="list-style-type: none"> - Handling regulations (L) – between UNIPETROL RPA, s.r.o. and ČESKÁ RAFINÉRSKÁ, a.s.
Employee of the Company	A natural person who is in a labor-law relationship with the Company based on an employment contract or agreement, or a natural person holding a job position in the Company based on other agreements and contracts.
Contractor	A legal entity or a natural person that is in a commercial-law or a civic-law relationship with the Company and, as a contracting party (debtor), provides or is bound to provide contractual performance (or a mandatory performance resulting from the contractual relationship) to the Company.
Employee of another organization	Contractor and all persons that, on behalf of the contractor, provide specific performance to Company.
FAS	Field amenity shelter (supervision room – local control room for operators – operating employees of the Company)
FOS	Flushing Oil Supply

3. Mechanical securing of equipment

If a certain part of an equipment is to be dismantled for the purposes of repair (or a complete decommissioning), it must first be mechanically detached from all equipment containing hydrocarbons, toxic gases, toxic chemicals, corrosives (e.g. sodium hydroxide), vapor, nitrogen and also from the flare and sewerage piping. This detachment, which is always preferentially done using so-called blinds, must be performed in line with the pipeline class (see the PPÚ 112 “Regulation for Pipeline Classes”).

¹ **K+L** – documents that are used in the Kralupy refinery as well as in the Litvínov refinery

² **K** – documents that are used in the Kralupy refinery

³ **L** – documents that are used in the Litvínov refinery

Directive no. 407 “Mechanical Securing of Equipment”

It is necessary to realize that in all cases of mechanical securing of equipment, hereunder, which is performed in order to safely secure the equipment, the securing procedure itself can be highly risky because equipment is opened, which contains hazardous chemicals (toxic, caustic, extremely or highly flammable, etc.) and/or pressurized substances – in case of detaching through one fitting only.

Therefore it is always necessary, prior to each such work, to consider this hazard and to adequately set such measures in the “Permit to Work” conditions that will eliminate and/or reduce the risk to an acceptable level so as to be able to safely perform the mechanical securing of equipment.

The mechanical securing is considered safe, if:

- a) All pipelines attached to the dismantled/repared equipment are separated by a blind at the flange joints (in case of a revolving blind in the pipeline, the blind must be in a closed position).
- b) Connection pipes are dismantled and ending flanges are installed at open ends of the equipment being secured (e.g. in case of dismantling a pump, etc., it is necessary to install end blinds at the beginning of the delivery pipe and at the end of the suction pipe). Blinding the spiral casing of the rotating equipment is considered sufficient.
- c) In exceptional cases, under the conditions defined in item 4.2, a procedure may be used, which consists in closing the equipment inlet and outlet fittings, or also other fittings on other inlets to the equipment (e.g. heating, flushing, etc.). In such a case, all fittings must be in the closed position and secured by a chain, locked by a padlock and marked with a sign “Caution! Hazard! Do not operate the equipment” (for the sign specimen, see the Appendix no. 406/D to the directive no. 406 “Electrical Securing of Equipment for Machinery Repair”), informing about the actual status of the equipment. Keys are permanently kept at the Control Room (**FAS**).

To be able to safely perform the mechanical securing as per the items a) and b) above, the equipment must be depressurized (using a release fitting) prior to performing the securing, or mechanical securing as per the items c) must be performed.

4. Rules for mechanical securing of equipment

4.1 Prior to commencing the mechanical securing of equipment, the operators shall first depressurize, flush (e.g. by FOS), empty and (as applicable) steam the equipment (see the **operating documents**). They shall close all inlet and outlet fittings of the equipment and mark them with a sign “**Caution! Hazard! Do not operate the equipment!**”. Each sign has an information filled in – serial number (based on the growing number range from the equipment mechanical securing logbook) and an information on who and when requested the mechanical securing, who and when performed (checked) the mechanical securing, including signatures and information on whether the blinding/securing is due to maintenance work or an investment. Information regarding the status of the fittings, who and when closed – opened them, must be recorded by the operator who has handled the equipment into the mechanical equipment logbook. If the mechanical securing is performed by the operators themselves, based on their competences, they are fully responsible for safe execution of the mechanical securing. If the mechanical securing is performed by employees of other organizations, the employee of another organization is responsible for performing the mechanical securing properly. Operators are responsible for checking the mechanical securing thoroughly.

4.2 The mechanical securing of equipment is performed in the way described the Chapter 3. The procedure stated in the Chapter 3, item a) is considered a reliable and safe way of securing the equipment. This ways of securing has always a priority, regardless of how time or cost demanding it can be. If the equipment cannot be secured according to the Chapter 3, item a), the securing shall be performed as per the Chapter 3, item b). If the procedures stated in the Chapter 3, items a) and b) cannot be used because the technical options and the layout of the machining arrangement don't allow that, the Chapter 3, item c) shall be followed.

Directive no. 407 “Mechanical Securing of Equipment”

For this way of securing, the “Mechanical Securing Checklist” must be drawn up by the foreman of the relevant unit.

Use of the mechanical securing must be approved by the operation and maintenance coordinator (in case of his/her absence, by the head of the relevant operation), the unit foreman and the contractor. Outside the working hours of the operation and maintenance coordinator or the head of the relevant operation, the Shift manager is the approver of the mechanical securing. The resulting document of this approval is the mechanical securing drawing diagram along with a mechanical securing checklist (form no. 407/1) containing which fittings are to be closed and which are to be open – e.g. fittings for releasing into collection slop piping and pits, to ensure a zero pressure in the equipment to be blinded, in case any of the closed fittings would leak. The Permit-to-Work (see the directive no. 435 “Permit to Work”) must contain a justification of the way of mechanical securing according to the Chapter 3, item c).

Performing the electrical securing is described in the directive no. 406 “Electrical Securing of Equipment for Mechanical Repair”.

- 4.3** At the Control Room, or at the relevant **FAS**, logbooks are kept regarding the performed mechanical securing of equipment. The logbook contains the following information: identification of the secured equipment (equipment number), tag serial no. (based on the growing number range from the Mechanical Securing logbook), date of performing the mechanical securing, name of the person having performed the securing (having checked the securing), date of removal of the mechanical securing, name of the person having removed the mechanical securing (having checked the removal of the mechanical securing).
- 4.4** The submitter of the Permit-to-Work conditions for the repaired piece of equipment shall define where and how the mechanical securing shall be performed. Blinds and ending flanges must be installed as close to the equipment as possible.
If the work description contains blinding the pump's spiral casing (from the maintenance engineer) and this blinding is not changed by the conditions, it is not necessary to draw up a blinding plan.
For each blinding work, the issuer in cooperation with the submitter of the Permit-to-Work conditions must prepare a blinding plan (form no. 407/2) and a diagram, which depicts the positions of all blinds installed on the given equipment. This drawing shall be enclosed to the Permit-to-Work pertaining to work of this type.
The Permit-to-Work must contain measures/conditions, under which the blinding work must be performed (e.g. specification of the personal protective aids, use of an isolating breathing apparatus, etc.).
- 4.5** In case performing the mechanical securing would be highly risky, the way of repair shall be defined, based on the risk analysis – JHA (the Appendix no. 435/10 “Job Hazard Analysis (JHA)” is a separate appendix to the directive no. 435 “Permit to Work”), by the issuer of the Permit-to-Work, in cooperation with the submitter of the conditions or designated representative of the Production Section, HSQ Department representative and the recipient of the Permit-to-Work; this is to be done in writing while adhering to stricter safety measures (use of special suits, isolating breathing apparatuses, etc.). All participants to the repair (Production Section employees, as well as employees of other organizations) shall be demonstrably acquainted with this way of securing. By such work, it is meant e.g. opening the equipment, which contained or can contain H₂S, for the purposes of blinding it.
All ways of securing the equipment must be recorded in the mechanical securing logbook.
- 4.6** Upon completion of the repair, the operator shall check the un-blinding, open the equipment inlet and outlet fittings and check the proper setup of the pipeline route.
Prior to opening the fittings/valves, he/she shall remove the caution signs “Caution! Hazard! Do not operate the equipment!”. Prior to starting up the equipment, it is necessary to blind the sludging (drain) valves.
Only after that, the equipment is capable to be started up. The operator shall record all performed steps into the mechanical securing logbook.

Directive no. 407 “Mechanical Securing of Equipment”

- 4.7 The used blinds must comply, in terms of their make (material, size, thickness), with relevant technical standards and the pipeline class of the given blinding (see the PPÚ 112 “Regulation for Pipeline Classes”).
- 4.8 Like checking the work at blinding, proper conditions and procedures must be adhered to also at un-blinding. It is necessary to consider all risks associated with the un-blinding (effects of thermal expansion, heating the equipment, risks of fittings, etc.).
- 4.9 If, for one blind (blinding spot), there is e.g. another blinding request, such requirement shall be logged, using a different serial number, in the “Mechanical Securing” logbook and another equipment mechanical securing label shall be placed on the blind itself or the separating fitting – even though the actual physical blinding will not be performed again.
That means that in the end, some equipment mechanical securing spots will bear as many labels, as there are blinding requests – for the particular blinding spot. It is particularly necessary to distinguish the blinding for the actual repairs, blinding for pressure and tightness checks and blinding for investment projects. All work does not have to be performed under the coordination of a single supplier/contractor and it needs to be ensured that the blind/closed fitting is left in its spot until ALL work on the equipment is completed.

5. Examples of securing

The examples stated herein are for orientation only and the list is not exhaustive.

5.1 Dismantling pipeline bundles of heat exchangers

- Blind all four inlets and outlets.

5.2 Dismantling a whole set of pipeline bundles of heat exchangers

- In case it is necessary to dismantle/remove the bundles due to repair, review of envelopes or equalizing the necks, etc. of the whole array/series of heat exchangers (e.g. during shutdowns), blinding all four pipes, inlet and outlet, common media at this array/series is considered sufficient. In case it concerns a repair of a heat exchanger/cooler while in operation, it is necessary to perform blinding of all inlets and outlets at this equipment separately.

5.3 Dismantling a pump

- Close the blocking valves at the suction and delivery of the pump and mark them with caution signs: “Caution! Hazard! Do not operate the equipment!”.
- If possible, flush the pump (using FOS).
- Close the steam and cooling water and flushing inlet valves. Blind the relevant outlets as well.
- Open the sludging (and thus depressurize the pump). Empty the pump. Check tightness of the blocking valves at the suction and delivery of the pump.
- If the valves tightness check cannot be performed, the contractor performing the blinding must be notified about this risk, so as to accordingly adjust its work-technological procedure of inserting/removing the blinds. The acquainting/notification must be done in a demonstrable way, which is considered to be not just a verbal information but also entering an understandable text into the “Permit to Work” form, to the column 11 (Additional conditions), notifying about the risk.

5.4 Shutting down a furnace

- Blind the fuel gas (oil) piping always when the furnace is put out of operation, even if no repair work is performed there.

Directive no. 407 “Mechanical Securing of Equipment”

- For working inside a furnace (see the directive no. 408 “Safeguarding of Entry and Work in Confined Spaces and below the Ground Level”), it is necessary to blind all inlets (including e.g. the steam inlet) as well as outlets to and from the furnace.

6. Related documentation

6.1 Internal documentation

Directive no. 435	“Permit to Work”
Directive no. 406	“Electrical Securing of Equipment for Machinery Repair”
Directive no. 408	“Safeguarding of Entry and Work in Confined Spaces and below the Ground Level”
PPÚ 112	“Regulation for pipeline classes”

7. Separate appendices

Form no. 407/1	“Mechanical Securing Checklist”
Form no. 407/2	Handover/takeover sample protocol – list of blinding points

Note:
The forms are developed in the Czech language only.