

Date of publishing: 8. 7. 2021

Scope of validity:
ORLEN Unipetrol RPA s.r.o. (without branches)



MECHANICAL SECURING OF EQUIPMENT

Approved by: Executive director
Valid from: 25/05/2021
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English version prepared by: External translation services

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List of changes

Change No.	Page No.		Subject changed	Valid from	Approved by (position, signature)
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Notice: The change management of this document is carried out according to Directive 821.

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1 Purpose

This document describes the procedures and responsibilities for the mechanical securing of the equipment so that the safety and health of the company's employees and employees of other organisations are not endangered and the environment is not endangered by the release of hazardous substances.

The purpose of the mechanical securing of the equipment is to install a mechanical barrier that will prevent the penetration of hazardous chemicals and/or pressurised substances into the equipment, which:

- a) is currently out of operation,
- b) has been shut down or opened,
- c) is a part of maintenance and investment work.

Furthermore, ensure that hazardous chemicals do not enter uncontrolled parts of the equipment or the surroundings of the equipment.

2 Scope of Validity

The Document is valid in the following marked companies/branches:

- ORLEN UNIPETROL RPA s.r.o. BENZINA, odštěpný závod
 POLYMER INSTITUTE BRNO, odštěpný závod

The document is valid only for the units Rafinerie Litvínov and Kralupy.

The document is not intended to address situations related to entry and work in hazardous areas in accordance with Directive No. 429 "Work in hazardous areas".

The issue avoids Directive No. 407 „Mechanical Securing of Equipment“, 5th issue of 05/06/2015, valid for ČESKÁ RAFINÉRSKÁ, a.s.

3 Terms, Definitions and Abbreviations

Operational documents	Operational documentation including the following internal and external documents: Internal documents K – Kralupy Refinery, L – Litvínov Refinery - Operators manual (K+L) - Work instruction (K) - Operational regulation (L) - 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)
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 organisation	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 Suply
H ₂ S	Sulfane / hydrogen sulphide
JRLI	Unit Rafinérie Litvínov
JRKR	Unit Rafinérie Kralupy

4 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”).

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 pressurised 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:

- 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).
- 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.
- 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/C to the directive no. 406 “Electric Isolation Procedure for Rotating Equipment Repairs”), 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 depressurised (using a release fitting) prior to performing the securing, or mechanical securing as per the items c) must be performed.

4.1 Rules for mechanical securing of equipment

- 4.1.1 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 organisations, the employee of another organisation is responsible for performing the mechanical securing properly. Operators are responsible for checking the mechanical securing thoroughly.

4.1.2 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. For this way of securing, the "Mechanical Securing Checklist" must be drawn up by the foreman of the relevant unit, see Appendix A of this Directive.

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, see Appendix A of this document, specifying 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".

4.1.3 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).

4.1.4 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 submitter of the Permit-to-Work conditions must, in cooperation with the issuer, prepare a blinding plan (Appendix B) 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.).

4.1.5 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 JRLI/JRKR, the 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 (employees of JRLI/JRKR as well as employees of other organisations) 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.

- 4.1.6 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.

- 4.1.7 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").

- 4.1.8 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.).

- 4.1.9 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.

4.2 Examples of securing

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

- 4.2.1 Dismantling pipeline bundles of heat exchangers

- Blind all four inlets and outlets.

- 4.2.2 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 equalising 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.

- 4.2.3 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 depressurise 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 employee of other organisation 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.

4.2.4 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.
- For working inside a furnace (see Directive No. 429 “Work in Hazardous Areas”), it is necessary to blind all inlets (including e.g. the steam inlet) as well as outlets to and from the furnace.

5 Responsibility

Responsibility is specified in the provisions of Chapter 4.

6 List of Related Documents

Directive no. 435	“Permit to Work”
Directive no. 406	“Electric Isolation Procedure for Rotating Equipment Repairs”
Directive no. 429	“Work in Hazardous Areas”
PPÚ 112	“Regulation for pipeline classes”

Appendix A Mechanical Securing Checklist

Kontrolní list mechanického zajištění zadejte technické místo

Číslo pozice	Popis pozice	Způsob zajištění	Provedl Jméno a příjmení*	Datum	Podpis
1					
2					
3					
4					
5					

V případě potřeby doplňte řádky.

Jedná se o rizikové zajištění stroje - pouze 1 armatura s řetězem a zámkem.

Dopředu není známo, zda armatury vykazují těsnost.

Těsnost armatur bude ověřena při vypouštění stroje, zda nedochází ke stálému výtoku produktu; práce v IDP.

Tlak na sání čerpadla je zadejte hodnotu, na výtlačku zadejte hodnotu. Teplota na sání a výtlačku je zadejte hodnotu °C. Produktem jsou zadejte text.

Práce bude probíhat za asistence HZSP.

Pracoviště bude ohraničené se zákazem vstupu.

S rizikovým zajištěním stroje budou seznámeni operátoři provozu a kontraktóři-ti zvlášť před zahájením práce.

Vyberte body vztahující se k mechanickému zajištění, případně doplňte další body a podstatné informace.

Komise	Jméno a příjmení*	Datum	Podpis
Koordinátor provozu a údržby**/Směnový manažer***			
Mistr úseku			
Kontraktor/uvést firmu			

* kolonku vyplňte hůlkovým písmem

** ranní směna ; *** směna odpolední, noční, víkendy a svátky

Note:

The appendix is developed in the Czech language only.

Appendix B Handover/takeover sample protocol – list of blinding points

PROTOKOL O PŘEDÁNÍ / PŘEVZETÍ - SEZNAM ZASLEPOVACÍCH MÍST

VZOR

Číslo protokolu:

Číslo listu:

Provoz/Stavba:		PS:						Označení zařízení:							
Poř. číslo	ZASLEPOVACÍ MÍSTO (označení hrdla, DN/PN, medium, PEFS)	ZASLEPENÍ						ODSLEPENÍ							
		Za provoz			Za údržbu			Č. povol. k práci	Za provoz			Za údržbu			Č. povol. k práci
Jméno	Podpis	Datum	Jméno	Podpis	Datum	Jméno	Podpis		Datum	Jméno	Podpis	Datum			

Všechny záslepky dle seznamu instalovány

Za provoz: dne:

Za údržbu: dne:

Za zhotovitele: dne:

Všechny záslepky dle seznamu demontovány

Za provoz: dne:

Za údržbu: dne:

Za zhotovitele: dne:

Za úplnost seznamu zaslepovacích míst

Schvaluji: dne:

Note:

The appendix is developed in the Czech language only.