Resources Safety & Health
Queensland

# Underground coal mines: VCD Hatch Seals

Queensland Mines Inspectorate

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# Forward

On 22 May 2020 the Coroner delivered Inquest Findings into the death of Mr Paul McGuire . Mr McGuire died on 6 May 2014 when he attempted to enter a sealed goaf area of an underground coal mine. The air within the goaf was 'irrespirable' and had an oxygen concentration that would not support life.

The Coroner recommended that the Department establish a guideline of what may be considered in relation to preventing further ingress to the goaf during sealing up operations.

The Coroner also noted that the obligation is upon the individual mine operator to assess each individual circumstance to determine what is an appropriate design, and other relevant considerations for their hatch seals. They cannot abrogate their duty to the Department because it is their responsibility under the law to take the appropriate steps to protect all their coalmine workers.

The SSE shall ensure that the UMM includes the potential hazard of any persons entering an area of an underground mine that is being sealed in the risk assessment for this activity. This shall ensure the controls to prevent any potential further ingress of persons to the GOAF during and after the completion of sealing operations.

This guideline is intended to address the recommendation that the Coroner made in relation to the design and signage of hatches.

# Contents

# Purpose and Scope

This guideline provides information on life cycle requirements for ventilation control device (VCD) hatch seals. Guidance is provided on ways to minimise the risk of coal mine workers entering in an unauthorised manner a hatch and an irrespirable atmosphere.

It is up to the individual mine operator and Site Senior Executive (SSE) to assess each individual circumstance to determine what is an appropriate design, and other relevant considerations for their hatch seals. The guideline is not all-encompassing because there are so many different considerations at different mines, and the obligation rests with the mine operator to protect coal mine workers.

# Definition

## *Hatch Seal*

A hatch is a ventilation control device inserted into a seal designed to assist conditioning of the goaf. A hatch includes a door inserted in a seal.

## *Goaf*

That part of a mine from which the coal has been partially or wholly extracted and then abandoned.

# Risk Assessment

The mine must undertake a risk assessment of the seal and hatch seals:

- as per requirements of the *Coal Mining Safety and Health Act 1999* and the Coal Mines Safety and Health Regulation 2017. Requirements of Division 5 Routine and Emergency Sealing of the Coal Mines Safety and Health Regulation 2017 must be addressed
- including all aspects of the seal and hatch seal life-cycle including design, construction, operation and maintenance
- risks associated with the potential for any persons entering or attempting to enter a hatch during or after the sealing up operations must be considered.

# Safe Work procedure

Mines utilising hatch seals:

- shall develop and implement risk assessed safe work procedures which cover the life cycle of the hatch seal
- shall ensure that the construction of seals with hatches are constructed in accordance with the permit to construct a seal
- shall ensure that seal construction activities are supervised by an ERZ Controller
- should consider use of access permits for all work in around any hatch seal
- shall include procedures and processes that ensure seals and hatch seals are inspected by an ERZ Controller for dangerous gases prior to any work being undertaken in the vicinity of the seal
- persons or tradesmen who are not familiar with areas of the underground workings where the potential for accumulations of gases can request to be accompanied by a person appointed as an ERZ Controller. i.e. In an area of the mine where sealing of underground workings is being undertaken.

# Hatch Seal Considerations

## *Design*

Hatch seals are an integral part of the VCD seal design. Design and certification of a seal must include the hatch or hatches installed in the seal and as a minimum meet regulatory requirement as specified in Division 5; Routine and Emergency Sealing, Coal Mines Safety and Health Regulation 2017.

Each mine will have a unique combination of design requirements and durability hazards which need to be considered on a case by case basis.

Hatch seal designs must:

- meet regulatory requirements
- be designed and certified by suitably qualified and competent person
- be supported by risk assessments, engineering calculations, drawings and documentation assumptions, limitations, and conditions of use
- consider the need for the design to accommodate explosive conditions as well as a hydraulic head that may be imposed on the seal over the seal life
- consider other loads such as loads imposed by strata conditions that may impact on the integrity of the seal during its life cycle
- be resistant to fire as well as overpressure
- consider long term material selection, design loads, design life including environmental durability for example the impact of corrosive water, gases, accidental impact, spontaneous combustion

- the hatch seal should be sufficiently robust to resist flexing and distortion due to loads imposed during transport and installation
- include means to prevent unintended access through the hatch seal. This may be a fixed or lockable mesh insert in the hatch which prevents personnel access through the hatch void
- consider the hatch operational positions. Hatches may be open, closed or partially open. Partially open hatches may be required during goaf purging operations. Means of securing the hatches in the selected positions to prevent inadvertent access shall be provided. This may be via the use of a secure lock such as a lock controlled by the ventilation officer or ERZ controller
- remain totally and permanently sealed when the hatch doors are closed
- have indelible warning signs or markings to indicate the danger of a potentially irrespirable atmosphere behind or adjacent to the hatch
- have signage that meets or exceeds requirements of the relevant Australian Standards.

The outer door of a typical hatch seal is shown in Figure 1. A hatch seal with a lockable mesh insert is shown in Figure 2.


Figure 1: Typical Hatch Seal

Figure 2: Hatch Seal fitted with a lockable mesh barrier

## *Installation*

Factors to be considered include:

- the hatch seal shall be installed as per the designers' instructions
- a seal construction certification process shall be in place at the mine to verify that the seal, including the hatch seal has been constructed and installed as per the design requirements
- when pipes are included in a seal for the purpose of future inertisation the pipes should be locked in the closed position to prevent inadvertent access or exposure to the goaf atmosphere
- once hatch is permanently closed it should be sealed in a manner that prevents any possibility of future opening (for example shotcrete over).

## *Barricades and signs*

- Unauthorised access to the seal and hatch seal site should be restricted by a physical barricade and signs
- Sign posting alone should not be relied on to prevent unauthorised entry to behind the seal. Security devices such as locks and preferably fixed barriers should be installed. The fixed barrier may be of a temporary design such as a mesh wall. Use of only "No Road" tape is not an acceptable control
- Barricades should be signed indicating the potential consequence of an irrespirable atmosphere and the requirement of an ERZ controller to conduct an inspection prior to access
- A typical seal installation plan view showing a barricade and hatch seal to restrict entry to goaf areas is shown in Figure 3.

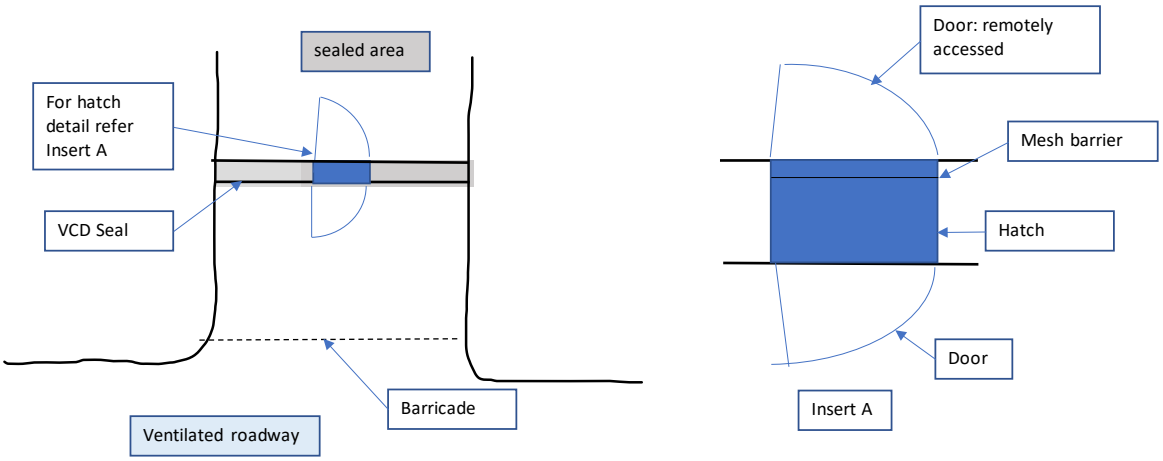


Figure 3: Plan view of typical VCD seal and hatch

## *Operation*

- A system of regular documented inspection of seals and hatch seals shall be implemented
- The inspection regime will be documented in the Standard Operating Procedure for Inspections
- The use of ventilation officer or ERZ controller's locks to secure hatches in required operational positions to prevent inadvertent access shall be implemented
- Seals and hatch seal inspections by an ERZ Controller prior to workers entering a seal location should be used
- The inspection frequency shall be determined in accordance with the risk associated with the specified use of the hatch seals such as goaf purging operations where this may take an extended period of time before the goaf gases reach a stable point.

Specific detailed inspection and access controls must be implemented during goaf purging operations as a clear danger exists that persons may inadvertently access the hatch seals because they are not fully sealed.

## *Maintenance*

A documented maintenance program should be implemented which covers the life of the seal.

# References

1. CORONERS COURT OF QUEENSLAND
   FINDINGS OF INQUEST
   CITATION: Inquest into the death of Paul Thomas McGuire
   TITLE OF COURT: Coroner's Court
   JURISDICTION: Mackay
   FILE NO(s): COR 2014/1616
   DELIVERED ON: 22nd May 2020