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# Is there significant amount of flammable material which is capable of producing a dangerous volume of explosive gas atmosphere?

Such as: Flammable storage, Process plants, Flammable gases etc.











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# Are there any sources of release?

Such as: openings in vessels, point of connection, flanges, vents, etc.











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#### Can the source of release be eliminated?



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#### The area is classified as

# Non Hazardous Area

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# **Determine the grade of release**

Continuous

**Primary** 

Secondary

Examples for continuous

Examples for Primary

Examples for Secondary

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# Secondary grade

#### Can it be eliminated?







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# Secondary grade of release

#### **Determine the grade of Ventilation**

<u>High (VH)</u>

Medium (VM)

Low (VL)

Ventilation grades

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# Secondary grade of release

# Degree of ventilation - VH Determine the availability of Ventilation



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Secondary grade of release

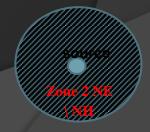
Degree of ventilation - VH Availability of Ventilation - Good

The type of zone is:

ZONE 2 NE / Non Hazardous

Indicates a theoretical zone which would be negligible extent under normal conditions.





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Secondary grade of release

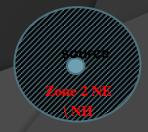
Degree of ventilation - VH Availability of Ventilation - Fair

The type of zone is:

**ZONE 2 NE / Non Hazardous** 

Indicates a theoretical zone which would be negligible extent under normal conditions.

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Secondary grade of release

Degree of ventilation - VH Availability of Ventilation - Fair

The type of zone is:

**ZONE 2 NE / Non Hazardous** 

Indicates a theoretical zone which would be negligible extent under normal conditions.

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Secondary grade of release

Degree of ventilation - VH Availability of Ventilation - Poor

The type of zone is:

#### **ZONE 2**

Use the appropriate code/model for calculating the extent of the zone.

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#### Secondary grade of release

Degree of ventilation - VL

The type of zone is:

ZONE 1 and even 0

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### Secondary grade of release

# Degree of ventilation - VM Determine the availability of Ventilation



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Secondary grade of release

Degree of ventilation - VM Availability of Ventilation - Good

The type of zone is:

**ZONE 2** 

Use the appropriate code/model for calculating the extent of the zone.

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Secondary grade of release

Degree of ventilation - VM **Availability of Ventilation - Fair** 

The type of zone is:

Use the appropriate code/model for calculating the extent of the zone.



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### Secondary grade of release

Degree of ventilation - VM Availability of Ventilation - Poor

The type of zone is:

#### **ZONE 2**

Use the appropriate code/model for calculating the extent of the zone.





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# **Primary grade**

# Can it be changed to secondary grade?



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# Primary grade of release

#### **Determine the grade of Ventilation**

High (VH)

Medium (VM)

Low (VL)

Ventilation grades



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# Primary grade of release

# Degree of ventilation - VH Determine the availability of Ventilation



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# Primary grade of release

Degree of ventilation - VH
Availability of Ventilation - Good

The type of zone is:

ZONE 2 NE / Non Hazardous

Indicates a theoretical zone which would be negligible extent under normal conditions.





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# Primary grade of release

Degree of ventilation - VH
Availability of Ventilation - Fair

The type of zone is:

**ZONE 2 NE / Non Hazardous** 

Indicates a theoretical zone which would be negligible extent under normal conditions.

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# Primary grade of release

Degree of ventilation - VH **Availability of Ventilation - Fair** 

The type of zone is:

Indicates a theoretical zone which would be negligible extent under normal conditions.

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# Primary grade of release

Degree of ventilation - VH **Availability of Ventilation - Poor** 

The type of zone is:

Use the appropriate code/model for calculating the extent of the zone.

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# Primary grade of release

Degree of ventilation - VL

The type of zone is:

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### Primary grade of release

# Degree of ventilation - VM Determine the availability of Ventilation



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# Primary grade of release

Degree of ventilation - VM Availability of Ventilation - Good

The type of zone is:

#### **ZONE 1**

Use the appropriate code/model for calculating the extent of the zone.





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Primary grade of release

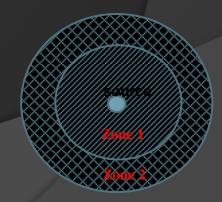
Degree of ventilation - VM Availability of Ventilation - Fair

The type of zone is:

ZONE 1 + ZONE 2

Use the appropriate code/model for calculating the extent of the zone.

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Primary grade of release

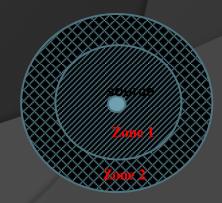
Degree of ventilation - VM Availability of Ventilation - Poor

The type of zone is:

ZONE 1 + ZONE 2

Use the appropriate code/model for calculating the extent of the zone.

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# **Continuous grade**

# Can it be changed to primary grade?



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Continuous grade of release

**Determine the grade of Ventilation** 

High (VH)

Medium (VM)

Low (VL)

Ventilation grades

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# **Continuous grade of release**

# Degree of ventilation - VH Determine the availability of Ventilation



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# Continuous grade of release

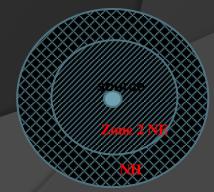
Degree of ventilation - VH Availability of Ventilation - Good

The type of zone is:

ZONE 2 NE / Non Hazardous

Indicates a theoretical zone which would be negligible extent under normal conditions.





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Continuous grade of release

Degree of ventilation - VH **Availability of Ventilation - Fair** 

The type of zone is:

Indicates a theoretical zone which would be negligible extent under normal conditions.

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# Continuous grade of release

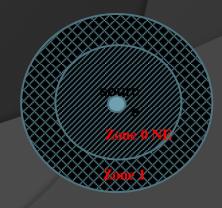
Degree of ventilation - VH Availability of Ventilation - Poor

The type of zone is:

**ZONE 0 NE / ZONE 1** 

Indicates a theoretical zone which would be negligible extent under normal conditions.

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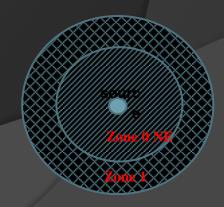
Continuous grade of release

Degree of ventilation - VH **Availability of Ventilation - Poor** 

The type of zone is:

Use the appropriate code/model for calculating the extent of the zone.

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# **Continuous grade of release**

Degree of ventilation - VL

The type of zone is:

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# **Continuous grade of release**

# Degree of ventilation - VM Determine the availability of Ventilation



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# Continuous grade of release

Degree of ventilation - VM Availability of Ventilation - Good

The type of zone is:

ZONE 0

Use the appropriate code/model for calculating the extent of the zone.

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# Continuous grade of release

Degree of ventilation - VM Availability of Ventilation - Fair

The type of zone is:

ZONE 0 + ZONE 2

Use the appropriate code/model for calculating the extent of the zone.



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# Continuous grade of release

Degree of ventilation - VM Availability of Ventilation - Poor

The type of zone is:

ZONE 0 + ZONE 1

Use the appropriate code/model for calculating the extent of the zone.



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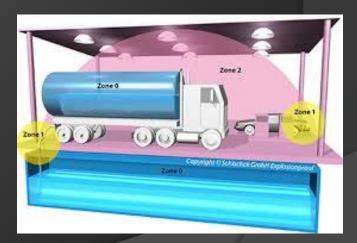
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### **Examples for Continuous grade of release**

- a) The surface of a flammable liquid in a fixed roof tank, with a permanent vent to the atmosphere.
- b) The surface of a flammable liquid which is open to the atmosphere continuously or for long periods





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# Examples for Primary grade of release

- a) Seals of pumps, compressors or valves if release of flammable material during normal operation is expected.
- b) Water drainage points on vessels which contain flammable liquids, which may release flammable material into the atmosphere while draining off water during normal operation.
- c) Sample points which are expected to release flammable material into the atmosphere during normal operation.
- d) Relief valves, vents and other openings which are expected to release fflammable material into the atmosphere during normal operation.







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### **Examples for Secondary grade of release**

- a) Seals of pumps, compressors and valves where release of flammable material during normal operation of the equipment is not expected.
- b)
  Flanges, connections and pipe fittings, where release of flammable material is not expected during normal operation.



- c)
  Sample points which are not expected to release flammable material during normal operation.
- d)

  Relief valves, vents and other openings which are not expected to release flammable material into the atmosphere during normal operation.



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### High ventilation (VH)

Can reduce the concentration at the source of release virtually instantaneously, resulting in a concentration below the lower explosive limit. A zone of negligible extent results. However, where the availability of ventilation is not good, another type of zone may surround the zone of negligible extent

### **Medium ventilation (VM)**

Can control the concentration, resulting in a zone stable boundary, whilst the release is in progress, and where the explosive gas atmosphere does not persist unduly after the release has stopped.

The extent and type of zone are limited to the design parameters

#### Low ventilation (VL)

Cannot control the concentration whilst release is in progress and/or cannot prevent undue persistence of a flammable atmosphere after release has stopped.



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