HSWA

QUICK GUIDE

How to use the quantity-ratio sum (QRS) to work out whether a workplace requires a 'hazardous substance location' (HSL) or a location compliance certificate (LCC)

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Te Kāwanatanga o Aotearoa
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WORKSAFE
Mahi Haumaru Aotearoa

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1.0 Who is this guidance for?

This guidance is for a person conducting a business or undertaking (PCBU). It is for PCBUs that want to work out, based on the hazardous substances they use, make or hold:

- whether their workplace requires a ‘hazardous substance location’ (HSL)
- whether they will need a location compliance certificate (LCC).

2.0 What does this guidance cover?

This guidance shows how to use a formula that calculates the sum of ratios (called the quantity-ratio sum – QRS).

This ratio determines whether your workplace requires an HSL or needs an LCC. This is provided for in regulation 10 of the Health and Safety at Work (Hazardous Substances) Regulations 2017 (the Hazardous Substances Regulations).

This guidance:

- explains what you need to know to calculate the QRS
- explains how to calculate the QRS
- provides worked examples.

If you do not want to calculate the QRS yourself, you can use the Hazardous Substances calculator to do it.

3.0
When does this guidance not apply?

This guidance does not cover class 1 explosives. Regulation 10(6) describes the QRS requirements for explosives.

Where compliance certification is required at any amount of a substance or based on the capacity of the container (for example, certification of tank wagons or stationary containers systems), the QRS will not need to be applied. An example of this is class 6.1A substances, where any amount of a 6.1A substance is required to be under the control of a certified handler.

The guidance only applies to location compliance certification. It does not apply to certification of:

- tank wagons
- stationary container systems
- certified handlers.

The QRS is also not used in determining requirements for thresholds that do not require certification (for example, for signage). Regulation 10(1) refers to the QRS being used to determine whether the requirement for an HSL or an LCC is activated.

4.0
What are location compliance certificates (LCCs)?

Compliance certifiers are authorised by WorkSafe New Zealand to issue compliance certificates required by the Hazardous Substances Regulations for matters that are within the scope of their authorisation. Compliance certificates may be required for people, locations, plant, buildings or equipment.

You can find a list of compliance certifiers at Register of compliance certifiers
You can filter this list to find a certifier that fits your situation.

Compliance certifiers charge for their work. The cost of issuing compliance certificates varies between compliance certifiers. You should contact several certifiers to discuss the services they offer and their fees.

When may you need an LCC?

You may require an LCC if you have explosive, flammable, oxidising, toxic or corrosive substances, and the quantity exceeds the thresholds specified in the Hazardous Substances Regulations.

An LCC certifies that the HSL where the substances are used and stored is managed according to the rules.

Further details on LCC can be found at Location compliance certificates

5.0 What do you need to calculate the QRS?

You need to find out what hazardous substances you have, their hazard classifications, and quantity held.

You can find the classifications from the substances' SDSs (safety data sheets). Depending on how old the SDS is, the classification listed may either be the pre-30 April 2021 HSNO classification or the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

For the QRS calculation, you will need the pre-30 April 2021 HSNO classification as these are the classifications used in the Hazardous Substances Regulations.

About pre-30 April HSNO classification and GHS classification, and converting between the classifications

For the pre-30 April 2021 HSNO classification, substances were assigned:

1. Numbered Classes: These classes (for example, class 3, class 6) indicate the inherent hazardous properties of a substance.
2. Numbered Subclasses: These subclasses (for example, subclass 3.1, subclass 6.1) specify the type of hazard posed by a substance.
3. Lettered Categories: These categories (for example, category A) indicate the severity of the hazard posed by a substance.

For the GHS classification, the substances (except for class 1 explosives) are assigned hazard descriptors and categories or types.

To convert a GHS classification to the pre-30 April 2021 HSNO classification, use this table HSNO-GHS 7 Correlation Tables

For example:

- GHS flammable gas Category 1 = pre-30 April 2021 HSNO class 2.1.1A
- GHS skin corrosion Category 1B = pre-30 April 2021 HSNO class 8.2B.

See Appendix 1 for more information about pre-30 April 2021 HSNO classifications.

6.0 How can you calculate the QRS?

What is the QRS formula?

The QRS is calculated using the following formula:

$QRS = \Sigma [qp_i/qa_i]$
= (quantity held of classification A/threshold for classification A) + (quantity held for classification B/threshold for classification B)+...

This involves working out the ratio of the amounts of hazardous substances for each hazard classification you have, divided by their threshold value (from the Hazardous Substances Regulations), and then adding it to other relevant ratios (see below).

- If the QRS is >1, the **threshold has been exceeded – the site has triggered the requirement for an HSL and/or an LCC**.
- If the QRS is 1 or less than 1, the threshold **has not been exceeded – the site has not triggered the requirement for an HSL and/or an LCC**.

Which ratios should be added together in the QRS?

Generally, you should add together the amounts of substances you have for each classification. Then use this amount to calculate the ratio for each classification. The ratios from substances of the same subclass are then added together to calculate the final QRS of each subclass. However, there are exceptions:

- Not all hazard classifications within a subclass should be added together or included in the QRS calculation. Table 1 shows which hazard classifications for each subclass can be added together in the QRS calculation.
- For some classifications, the thresholds are dependent on container size or whether the container is open or closed. When there is a different threshold for substances of the same subclass, calculate the ratios separately for these.
- If substances would need to be stored in different HSLs (for example, class 5.1.1 substances 'manufactured or used' and substances 'in packages that are closed at all times'), the QRS values must be calculated separately and not added together. This also applies to class 5.1.2 and 5.2 substances.
- Class 6 and 8 substances are added together unless the substances are incompatible. When class 6 and 8 substances are incompatible, they must be segregated and stored at separate HSLs. This means they are not added together when calculating the QRS (see regulation 13.29 and Schedule 15 Incompatible substances for details, as well as the SDS for incompatibilities).

For guidance on when quantities of the same subclass should be added together when determining if an HSL should be established, see WorkSafe's webpage When to aggregate quantities in establishing a hazardous substance location

Section 7 provides worked examples.

HSNO SUBCLASS	HAZARD CLASSIFICATION WITHIN SUBCLASS THAT ARE ADDED TOGETHER
2.1.1 Flammable gases	2.1.1A ✓ 2.1.1B ✓
2.1.2 Flammable aerosols	2.1.2A ✓
2.2 Flammable liquids	3.1A ✓ 3.1B ✓ 3.1C ✓ 3.1D ✗
3.2 Liquid desensitised explosives	3.2A ✓ 3.2B ✓ 3.2C ✓
4.1.1 Readily combustible solids and solids that may cause fire through friction	4.1.1A ✓ 4.1.1B ✓
4.1.2 Self-reactive substances	4.1.2A ✓ 4.1.2B ✓ 4.1.2C ✓ 4.1.2D ✓ 4.1.2E ✓ 4.1.2F ✓ 4.1.2G ✓
4.1.3 Solid desensitised explosives	4.1.3A ✓ 4.1.3B ✓ 4.1.3C ✓
4.2 Spontaneously combustible substances	4.2A ✓ 4.2B ✓ 4.2C ✓
4.3 Solids that emit flammable gas when in contact with water	4.3A ✓ 4.3B ✓ 4.3C ✓
5.1.1 Oxidising substances that are liquids or solids	5.1.1A ✓ 5.1.1B ✓ 5.1.1C ✓
5.1.2 Oxidising substances that are gases	5.1.2A ✓
5.2 Organic peroxides	5.2A ✓ 5.2B ✓ 5.2C ✓ 5.2D ✓ 5.2E ✓ 5.2F ✓ 5.2G ✗

SUBCLASS	HAZARD CLASSIFICATIONS THAT ARE ADDED TOGETHER IF COMPATIBLE
6.1 Substances that are acutely toxic **8.2** Substances that are corrosive to dermal tissue	6.1A ✓ 6.1B ✓ 6.1C ✓ 6.1D ✗ 6.1E ✗ 8.2A ✓ 8.2B ✓ 8.2C ✗

✓ Indicates that the classification is used in the QRS calculation

✗ Indicates that the hazard classification is **not** used in the QRS calculation

TABLE 1: Hazard classifications that can be added together in the QRS calculation

7.0
Where can you find examples showing how to calculate QRS values for different classes of substances?

The following examples show how to calculate QRS values of class 3, 5, 6 and 8 substances.

Examples of the QRS calculations with only class 3 substances

Example: Class 3.1A substance and class 3.1B substance in closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 1 x 10 L container of acetaldehyde (a 3.1A substance) in a closed container
- 4 x 20 L containers of isopropanol (a 3.1B substance) in closed containers.

Regulation 10.26 sets out a PCBU's duty to establish an HSL for class 3 substances

- The threshold quantity for a 3.1A substance that is not petrol, aviation gasoline, or racing gasoline = 20 L; for a 3.1B substance in closed containers more than 5 L is 100 L (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements).

SUBSTANCE	CLASSIFICATION	AMOUNT HELD	THRESHOLD (FOR AN HSL)	RATIO
Acetaldehyde	3.1A	10 L (1 x 10 L)	20 L (in open or closed containers)	0.5 (10 L/20 L)
Isopropanol	3.1B	80 L (4 x 20 L)	100 L (in closed containers more than 5 L)	0.8 (80 L/100 L)
			QRS	**1.3 (0.5 + 0.8)**

For classes 1–5, substances of the **same subclass** are added together. After adding the ratios together, the **QRS is 1.3**. This means that the **HSL threshold has been exceeded** and **the workplace requires an HSL**. **An LCC is also required**.

Note there are class 3.1 threshold variations for fuel and pesticides on a farm.

Example: Multiple class 3.1B and 3.1C substances in closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 1 x 20 L of Substance A (class 3.1B) in a closed container
- 2 x 10 L of Substance B (class 3.1B) in closed containers
- 5 x 10 L of Substance C (class 3.1B) in closed containers
- 5 x 20 L of Substance D (class 3.1C) in closed container
- 2 x 100 L of Substance E (class 3.1C) in closed containers.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

CLASSIFICATION	TOTAL AMOUNT HELD	THRESHOLD (FOR AN HSL) (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements)	RATIO
3.1B	90 L (1 x 20 L + 2 x 10 L + 5 x 10 L)	100 L (in closed containers more than 5 L)	0.9 (90/100)
3.1C	300 L (5 x 20 L + 2 x 100 L)	500 L (in closed containers more than 5 L)	0.6 (300/500)
		QRS	**1.5**

For classes 1–5, substances of the **same subclass** are added together. As the QRS is greater than 1 (1.5), the **HSL threshold has been exceeded** and **the site requires an HSL. An LCC is also required**.

Example: Class 3.1A and 3.1B substances in open and closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 1 x 20 L of Substance A (class 3.1B) in an open container
- 1 x 20 L of Substance B (class 3.1B) in a closed container
- 5 x 2 L of Substance C (class 3.1B) in closed containers
- 5 x 20 L of Substance D (class 3.1C) in closed containers
- 2 x 100 L of Substance E (class 3.1C) in open containers.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

CLASSIFICATION	TOTAL AMOUNT HELD	THRESHOLD (HSL) (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements)	RATIO
3.1B	20 L	50 L (in open containers)	0.4 (20/50)
3.1B	20 L	100 L (in closed containers more than 5 L)	0.2 (20/100)
3.1B	10 L (2 x 5 L)	250 L (in closed containers up to 5 L)	0.04 (10/250)
3.1C	100 L (5 x 20 L)	500 L (in closed containers more than 5 L)	0.2 (100/500)
3.1C	200 L (2 x 100 L)	250 L (in open containers)	0.8 (200/250)
		QRS	**1.64**

For classes 1–5, substances of the **same subclass** are added together. As the QRS is greater than 1 (1.64), the **HSL threshold has been exceeded** and **the workplace requires an HSL. An LCC is also required**.

Example: Class 3.1A-D substances in closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 1 x 10 L of Substance A (not petrol, aviation gasoline or racing gasoline) (class 3.1A) in a closed container
- 20 x 5 L of Substance C (class 3.1B) in closed containers
- 100 x 5 L of Substance D (class 3.1C) in closed containers
- 1 x 1000 L of Substance E (class 3.1D) in a closed container.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

CLASSIFICATION	TOTAL AMOUNT HELD	THRESHOLD (HSL) (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements)	RATIO
3.1A (not petrol, aviation gasoline, and racing gasoline)	10 L (1 x 10 L)	20 L (in open or closed container)	0.5 (10/20)
3.1B	100 L (20 x 5 L)	250 L (in closed containers up to 5 L)	0.4 (100/250)
3.1C	500 L (100 x 5 L)	1,500 L (in closed containers up to 5 L)	0.33 (500/1500)
3.1D	1000 L (1 x 1000 L)	No threshold	Not applicable
		QRS	**1.23**

The 3.1D substance does not need to be included in the calculation as 3.1D does not trigger an HSL or LCC requirement (Table 1).

For classes 1–5, substances of the **same subclass** are added together. As the QRS is greater than 1 (1.23), the **HSL threshold has been exceeded** and **the site requires an HSL. An LCC is also required**.

Example: Class 3.1B and 3.1C substances in closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 10 x 20 L of Substance A (class 3.1B) in closed containers
- 2 x 100 L of Substance C (class 3.1C) in closed containers.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements)	RATIO
3.1B	200 L (10 x 20 L)	100 L (in closed containers more than 5 L)	0.5
3.1C	200 L (2 x 100 L)	500 L (in closed containers more than 5 L)	0.4
		QRS	**0.9**

As the QRS is less than 1 (0.9), the **HSL threshold has not been exceeded** and **the workplace does not require an HSL**.

Example: Area with substances that are Class 3 and Class 6

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 10 x 20 L containers of acetonitrile (a 3.1B and 6.1B substance) in closed containers in storage.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

- The threshold quantity for a 3.1B substance in closed containers more than 5 L is 100 L (From Table 4 Schedule 9: Quantities of classes 2-4 substances that activate HSL requirements).

Regulation 13.34 sets out a PCBU's duty to establish an HSL for class 6 or 8 substances

- The threshold quantity for a 6.1B substance in storage is 250 L.

SUBSTANCE	CLASSIFICATION	AMOUNT HELD	THRESHOLD (FOR AN HSL)	RATIO
Acetonitrile	3.1B and 6.1B	200 L (10 x 20 L)	3.1B – 100 L (in closed containers) 6.1B – 250 L	For 3.1 = 2 (200 L /100 L) For 6.1B = 0.8 (200 L/250 L)
			QRS for 3.1	**2**
			QRS for 6.1	**0.8**

As the QRS for class 3.1 is greater than 1 (2), the **HSL threshold has been exceeded** and **the area where the acetonitrile is stored requires an HSL for class 3.1**.

As the QRS for class 6.1 is less than 1 (0.8), the **HSL threshold has not been exceeded** and **the area where the acetonitrile is stored does not require an HSL for class 6.1**.

Examples of the QRS calculations with class 5 substances

Example: Class 5.1.1 substances that are being used or kept in packages that are closed at all times

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has class 5.1.1 substances that are being used or kept in packages that are closed at all times.

The area within the workplace has:

- 1 L of Substance A (class 5.1.1A) being used
- 20 L of Substance B (class 5.1.1B) being used
- 200 kg of Substance C (class 5.1.1B) kept in a closed container at all times
- 20 L of Substance D (class 5.1.1C) being used
- 400 kg of Substance E (class 5.1.1C) kept in a closed container at all times.

Regulation 12.8 sets out a PCBU's duty to establish an HSL for class 5.1.1 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From Tables 1 and 2 Schedule 10: Quantities of classes 5.1.1 and 5.1.2 that activate HSL requirements)	RATIO
5.1.1A	1 L	5 L (substance being used)	0.2 (1/5)
5.1.1B	20 L	50 L (substance being used)	0.4 (20/50)
5.1.1B	200 kg	500 kg (in closed containers)	0.4 (200/500)
5.1.1C	20 L	100 L (substance being used)	0.2 (20/100)
5.1.1C	400 kg	1000 kg (in closed containers)	0.4 (400/1000)
		QRS for 5.1.1 (kept in closed container at all times)	**0.8 (0.4 + 0.4)**
		QRS for 5.1.1 (being used)	**0.8 (0.2 + 0.4 + 0.2)**

For classes 1–5, substances of the same subclass are added together. However, class 5.1.1 substances to be 'manufactured or used' and substances 'in packages that are closed at all times' must be stored at separate HSLs (regulation 12.8 (2)). This means the QRS values for these are not added together. This also applies to class 5.1.2 and 5.2 substances.

As the QRS values are less than 1 (0.8), the **HSL threshold has not been exceeded** and the workplace **does not require an HSL or LCC**.

The LCC thresholds for class 5.1.1 substances are not the same as for HSLs. Regulation 12.17 sets out a PCBU's duty to establish an LCC for class 5.1.1 substances. They apply to all class 5.1.1 substances, whether they are in closed packages or are being manufactured or used.

Example: Class 5.1.1 substances that are being used

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 40 kg of Substance A (class 5.1.1B) being used
- 50 kg of Substance B (class 5.1.1C) being used.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

- The threshold quantity for a 5.1.1B substance where manufactured or used is 50 kg.
- The threshold quantity for a 5.1.1C substance where manufactured or used is 100 kg.

Regulation 12.8 sets out a PCBU's duty to establish an HSL for class 5.1.1 and 5.1.2 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (FOR AN HSL)	RATIO
5.1.1B	40 kg	50 kg (in use)	0.8 (40/50)
5.1.1C	50 kg	100 kg (in use)	0.5 (50/100)
		QRS for 5.1.1 HSL	**1.3 (0.8 + 0.5)**

As the QRS for 5.1.1 is greater than 1 (1.3), the **HSL threshold has been exceeded** and **the area where the substances are used requires an HSL for class 5.1.1**.

CLASSIFICATION	AMOUNT HELD	THRESHOLD (FOR AN LCC)	RATIO
5.1.1B	40 kg	500 kg (in use)	0.08 (40/500)
5.1.1C	50 kg	1000 kg (in use)	0.05 (50/1000)
		QRS for 5.1.1 LCC	**0.13 (0.08 + 0.05)**

However, the threshold for requiring a LCC for class 5.1.1 substances in use is 10 x higher than the HSL threshold for class 5.1.1. In this example, an LCC is not required.

Example: Substances that are Class 5.1.1 and Class 8.2

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has:

- 1 x 1000 kg container of chromium trioxide (a 5.1.1B and 8.2B substance) in a closed container in storage.

Regulation 10.26 sets a PCBU's duty to establish an HSL for class 3 substances

Regulation 12.8 sets out a PCBU's duty to establish an HSL for class 5.1.1 and 5.1.2 substances

- The threshold quantity for a 5.1.1B substance in closed containers is 500 kg.

Regulation 13.34 sets out a PCBU's duty to establish an HSL for class 6 or 8 substances

- The threshold quantity for an 8.2B substance in storage is 250 kg.

SUBSTANCE	CLASSIFICATION	AMOUNT HELD	THRESHOLD (FOR AN HSL)	RATIO
Chromium oxide	5.1.1B and 8.2B	1000 kg	5.1.1B – 500 kg (in closed containers) 8.2B – 250 kg	For 5.1.1 = 2 (200 kg /100 kg) For 8.2B = 4 (1000 kg/250 kg)
			QRS for 5.1.1	**2**
			QRS for 8.2	**4**

As the QRS for 5.1.1 is greater than 1 (2), the **HSL threshold has been exceeded** and **the area where the chromium oxide is stored requires an HSL for class 5.1.1**.

As the QRS for 8.2 is greater than 1 (4), the **HSL threshold has been exceeded** and **the area where the chromium oxide is stored also requires an HSL for class 8.2**.

This means the requirements for both 5.1.1B and 8.2B need to be met.

Example: Class 5 substances kept in closed containers at all times

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has:

- 150 kg of Substance A (class 5.1.1B) kept in a closed container at all times
- 300 kg of Substance B (class 5.1.1C) kept in a closed container at all times
- 50 kg of Substance C (class 5.1.2A) – non-permanent gas kept in a closed container at all times
- 0.5 kg of Substance D (class 5.2B) kept in a closed container at all times
- 8 kg of Substance E (class 5.2D) kept in a closed container at all times.

Regulation 12.8 sets out a PCBU's duty to establish an HSL for class 5.1.1 and 5.1.2 substances

Regulation 12.17 sets out the criteria for an LCC for class 5.1.1 and 5.1.2 substances

Regulation 12.34 sets out a PCBU's duty to establish an HSL for class 5.2 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From Tables 1 and 2 Schedule 10: Quantities of classes 5.1.1 and 5.1.2 that activate HSL requirements) (From Table 1 Schedule 11: Quantities of class 5.2 that activate HSL requirements)	RATIO
5.1.1B	150 kg	500 kg (in closed containers)	0.3 (150/500)
5.1.1C	300 kg	1000 kg (in closed containers)	0.3 (300/1000)
5.1.2A	50 kg	100 kg (non-permanent gas in closed containers)	0.5 (50/100)
5.2B	0.5 kg	More than 1 kg	0.5 (0.5/1)
5.2D	8 kg	More than 10 kg	0.8 (8/10)
		QRS for 5.1.1	**0.6 (0.3 + 0.3)**
		QRS for 5.1.2	**0.5**
		QRS for 5.2	**1.3 (0.5 + 0.8)**

For classes 1–5, substances of the **same subclass** are added together.

The QRS for the class 5.1.1 substances are added together as both the 5.1.1B and 5.1.1C substances are kept in closed containers at all times and so could be kept together (see previous example for explanation).

As the QRS for class 5.2 substances is greater than 1 (1.3), the HSL threshold has been exceeded and an HSL needs to be established for the class 5.2 substances but not for the 5.1.1 and 5.1.2 substances.

Class 5.1.1, 5.1.2 and 5.2 substances are all incompatible with each other so should not be stored together.

Example of the QRS calculations for class 5.1.2 gases

Example: Class 5.1.2A gases

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace has:

- 145.5 m^3 oxygen – permanent gas
- 71 kg chlorine – non-permanent gas.

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From Tables 1 and 2 Schedule 10: Quantities of classes 5.1.1 and 5.1.2 that activate HSL requirements)	RATIO
5.1.2A oxygen	145.5 m^3	200 m^3	0.725 (145.5/200)
5.1.2A chlorine	71 kg	150 kg	0.473 (71/150)
		QRS	**1.198 (0.725 + 0.473)**

For classes 1–5, substances of the **same subclass** are added together. The QRS for permanent and non-permanent gases of the same subclass can be added together.

As the QRS is greater than 1 (1.198), the **HSL threshold has been exceeded** and **the workplace requires an HSL**.

More about permanent and non-permanent gases

Permanent and non-permanent gases have separate thresholds as they are measured in different units. A 'permanent gas' means a gas with a critical temperature not exceeding –50°C.

A permanent gas is measured in m^3 and a non-permanent gas in kg.

Regulation 10(5) provides:

Where a quantity of gas is specified:

a. as cubic metres (m3), this volume is determined by taking the contents and conditions of the gas held in a container and then calculating the volume that the gas would occupy at 15°C and 101.3 kPa absolute pressure:

b. in kilograms (kg), this refers to the net weight of the gas in liquefied form as held in its container.

Calculations for all containers including cylinders should use the quantity of full containers as this is the maximum amount that might be in the workplace.

Class 6 or 8 gases do not have HSL or LCC requirements. Regulation 13.38 only includes solids and liquids that are stored.

Example of the QRS calculations for class 3 and class 5 substances

Where substances are incompatible they should be segregated and stored at separate HSLs, so they should not be added together when calculating the QRS.

Example: Class 3 and 5 substances in closed containers

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has:

- 20 x 5 L of Substance A (class 3.1B) in closed containers
- 100 x 5 L of Substance B (class 3.1C) in closed containers
- 1 x 150 L of Substance C (class 5.1.1B) kept in a closed container at all times
- 1 x 300 L of Substance D (class 5.1.1C) kept in a closed container at all times.

Regulation 10.26 sets out a PCBU's duty to establish an HSL for class 3 substances

Regulation 12.8 sets out a PCBU's duty to establish an HSL for class 5.1.1 substances

Regulation 12.17 sets out the criteria for an LCC for class 5.1.1 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From Table 4 Schedule 9: Quantities of classes 2–4 substances that activate HSL requirements) (From Table 1 Schedule 10: Quantities of classes 5.1.1 and 5.1.2 that activate HSL requirements)	RATIO
3.1B	100 L (20 x 5 L)	250 L (in closed containers up to 5 L)	0.4 (100/250)
3.1C	500 L (100 x 5 L)	1500 L (in closed containers up to 5 L)	0.33 (500/1500)
5.1.1B	150 L (1 x 150 L)	500 L (in closed containers)	0.3 (150/500)
5.1.1C	300 L (1 x 300 L)	1000 L (in closed containers)	0.3 (300/1000)
		QRS for 3.1	**0.73 (0.4 + 0.33)**
		QRS for 5.1.1	**0.6 (0.3 + 0.3)**

Subclasses 3.1 and 5.1.1 are not added together. For class 1 to 5, only substances of the **same subclass** are added together.

As the QRS is less than 1 (0.9), the **HSL threshold has not been exceeded** for class 3.1 or class 5.1.1. **The workplace does not require any HSLs or LCCs**.

Examples of the QRS calculations for class 6 and 8 substances

Example: Class 6 and 8 substances in storage with no incompatible substances

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The area within the workplace stores:

- 100 L of Substance A (class 6.1B)
- 400 kg of Substance B (class 6.1C)
- 100 L of Substance C (class 8.2B).

Regulation 13.34 sets out a PCBU's duty to establish an HSL for class 6 or 8 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From regulation 13.38)	RATIO
6.1B	100 L	250 L	0.4 (100/250)
6.1C	400 kg	1000 kg	0.4 (400/1000)
8.2B	100 L	250 L	0.4 (100/250)
		QRS	**1.2**

The ratios for class 6 and 8 substances (no incompatible substances) can be added together. As the QRS is greater than 1 (1.2), the **HSL threshold has been exceeded** and **the workplace requires an HSL**. **HSL and LCC thresholds are the same for class 6 and 8 substances. Note there are threshold variations for class 6 and 8 for a farm >4ha**.

HSLs for class 6 and 8 substances are only required for substances in storage. For more information: worksafe.govt.nz

Example: Class 6 and 8 substances stored with incompatible substances (acid/alkali)

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has:

- 100 L of Substance A (class 6.1B)
- 400 kg of Substance B (class 6.1C)
- 50 L of Substance C (class 8.2B alkali) – incompatible with acid
- 50 L of Substance D (class 8.2B acid) – incompatible with alkali.

Regulation 13.34 sets out a PCBU's duty to establish an HSL for class 6 or 8 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From regulation 13.38)	RATIO
6.1B	100 L	250 L	0.4 (100/250)
6.1C	400 kg	1000 kg	0.4 (400/1000)
8.2B alkali (incompatible with acid)	50 L	250 L	0.2 (50/250)
8.2B acid (incompatible with alkali)	50 L	250 L	0.2 (50/250)
		QRS for 8.2B stored with 6.1B and 6.1C	**1 (0.4 + 0.4 + 0.2)**
		QRS for 8.2B stored separately	**0.2**

The acid and alkali must not be stored in the same HSL as they are incompatible. Their ratios are not added together.

If one of the class 8.2B substances is stored with 6.1B and 6.1C substances, the ratios are added together.

As the QRS values are 1 and less than 1 (0.2), the **HSL threshold has not been exceeded** and **the workplace does not require an HSL**.

Example: Class 6 and 8 substances stored with incompatible substances (acid/cyanide)

The PCBU wants to know if they need to establish any hazardous substance locations at their workplace.

The workplace has:

- 20 kg of cyanide (class 6.1A)
- 300 L of Substance B (class 6.1C)
- 100 L of Substance C (class 8.2B acid) – incompatible with cyanide.

Regulation 13.34 sets out a PCBU's duty to establish an HSL for class 6 or 8 substances

CLASSIFICATION	AMOUNT HELD	THRESHOLD (From regulation 13.38)	RATIO
6.1A cyanide	20 kg	50 kg	0.4 (20/50)
6.1C	300 L	1000 L	0.3 (300/1000)
8.2B acid (incompatible with cyanide)	100 L	250 L	0.4 (100/250)
		QRS for 6.1A and 6.1C	**0.7 (0.4 + 0.3)**
		QRS for 8.2B acid stored separately	**0.4**

As the class 8.2B acid is incompatible with the 6.1A cyanide, these substances must be stored separately. The QRS for the class 8.2B acid is not added to the QRS for the class 6.1 substances.

As the QRS values are less than 1 (0.7 and 0.4), the **HSL threshold has not been exceeded** and **the workplace does not require an HSL**.

Appendix 1: Explanation of pre-30 April 2021 HSNO classes

The Hazardous Substances (Classification) Notice 2017, issued under the HSNO Act, established a system for classifying hazardous substances covered by the Health and Safety at Work Regulations. This system consists of three components:

1. Numbered Classes: These classes (for example, class 3, class 6) indicate the inherent hazardous properties of a substance.
2. Numbered Subclasses: These subclasses (for example, subclass 3.1, subclass 6.1) specify the type of hazard posed by a substance.
3. Lettered Categories: These categories (for example, category A) indicate the severity of the hazard posed by a substance.

The hazardous properties of a substance are classified to determine how the risks can be managed. There are eight key hazard classes:

- Class 1: explosives
- Class 2: flammable gases
- Class 3: flammable liquids
- Class 4: flammable solids
- Class 5: oxidising substances
- Class 6: substances toxic to people
- Class 8: corrosive substances
- Class 9: substances toxic to the environment.

The hazard classification of a substance is determined by combining the numbers and letters from these three components. For example, 3.1A is a hazard classification.

Notes:

- This 2017 EPA notice has been superseded, and the HSNO Act now utilises the GHS categories for classifying substances.
- Despite the existence of a newer Hazard Classification Notice, the HS Regulations still adhere to the classification system outlined in the 2017 Notice.
- SDSs must use GHS after April 30, 2025. PCBUs may still have pre-30 April 2021 HSNO classifications for substances supplied before this date.

In cases where the safety data sheet includes GHS categories, these must be converted to the pre-30 April 2021 HSNO classification using the correlation table provided in Schedule 3 of the Hazardous Substances (Hazard Classification) Notice 2020

Appendix 2: Regulation 10 of the Hazardous Substances Regulations

Regulation 10: References to quantities

1. In determining whether the requirement for a hazardous substance location or a compliance certificate is activated, the threshold quantity is exceeded if the quantity ratio sum is greater than 1 when determined in accordance with the following formula:

   quantity ratio sum = $\sum [qp_i/qa_i]$

   where:

   - ∑ is the symbol for summation of the calculated ratios for all the hazard classifications present
   - qpi is the quantity of substance with a particular hazard classification present
   - qai is the quantity of substance of that hazard classification that activates the relevant requirement.

2. The quantity ratio sum for class 1 to 5 substances must:
   a. sum only substances of the same subclass (for example, class 3.1A, 3.1B, and 3.1C substances), and
   b. include only those classes that trigger the requirement.

3. The threshold quantity ratio sum for class 6 and 8 substances must include both classes unless the substances are incompatible with each other as described in Schedule 15 and are stored separately.

4. Unless otherwise specified, the quantity of an organic peroxide must be determined by mass.

5. Where a quantity of gas is specified:
   a. as cubic metres (m^3), this volume is determined by taking the contents and conditions of the gas held in a container and then calculating the volume that the gas would occupy at 15°C and 101.3 kPa absolute pressure
   b. in kilograms (kg), this refers to the net weight of the gas in liquefied form as held in its container.

6. Where a quantity refers to a class 1 substance, that quantity must be a net explosive quantity (NEQ), where NEQ is the gross weight less the weight of any construction materials of the article in kilograms (kg).

Appendix 3: Regulations where QRS is used to determine if the requirement applies

REGULATION	REQUIREMENT	CLASSIFICATION	THRESHOLD REFERENCE
10.26	Duty of PCBU to establish hazardous substance location – for class 2, 3 and 4	2.1.1A, 2.1.1B, 2.1.2A 3.1A, 3.1B, 3.1C 3.2A, 3.2B, 3.2C 4.1.1A, 4.1.1B 4.1.2A, 4.1.2B, 4.1.2C, 4.1.2D, 4.1.2E, 4.1.2F, 4.1.2G 4.1.3A, 4.1.3B, 4.1.3C 4.2A, 4.2B, 4.2C 4.3A, 4.3B, 4.3C	Table 4 Schedule 9
10.34	Requirement to have compliance certificate if class 2.1.1, 2.1.2, or 3.1 substance present at hazardous substance location	2.1.1A, 2.1.1B 2.1.2A 3.1A, 3.1B, 3.1C	Table 4 Schedule 9
10.36	Requirement to have compliance certificate if class 3.2 or 4 substance present at hazardous substance location	3.2A, 3.2B, 3.2C 4.1.1A, 4.1.1B 4.1.2A, 4.1.2B, 4.1.2C, 4.1.2D, 4.1.2E, 4.1.2F, 4.1.2G 4.1.3A, 4.1.3B, 4.1.3C 4.2A, 4.2B, 4.2C 4.3A, 4.3B, 4.3C	Table 4 Schedule 9
12.8	Duty of PCBU to establish hazardous substance location where class 5.1.1 and 5.1.2 substances present	5.1.1A, 5.1.1B, 5.1.1C 5.1.2A	Table 1 and 2 Schedule 10
12.17	Requirement to have compliance certificate for hazardous substance location – for class 5.1.1 and 5.1.2	5.1.1A, 5.1.1B, 5.1.1C 5.1.2A	Regulation 12.17
12.34	Duty of PCBU to establish hazardous substance location where class 5.2 substance present Table 1 Schedule 11	5.2A, 5.2B, 5.2C, 5.2D, 5.2E, 5.2F	Table 1 Schedule 11
12.42	Requirement to have compliance certificate for hazardous substance location – for class 5.2	5.2A, 5.2B, 5.2C, 5.2D, 5.2E, 5.2F	Regulation 12.42
13.34	Duty of PCBU to establish hazardous substance location where certain class 6 or 8 substances present	6.1A, 6.1B, 6.1C 8.2A, 8.2B	Regulation 13.38
13.38	Compliance certificate required for hazardous substance location – for class 6.1 and 8.2	6.1A, 6.1B, 6.1C 8.2A, 8.2B	Regulation 13.38

Disclaimer

This publication provides general guidance. It is not possible for WorkSafe to address every situation that could occur in every workplace. This means that you will need to think about this guidance and how to apply it to your particular circumstances.

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