(HAE-026167) WORKING IN CONFINED SPACES

Note:
- Clarification of natural ventilation / enclosed character.
- Addition of definition of 'when entry begins'.

1. Purpose

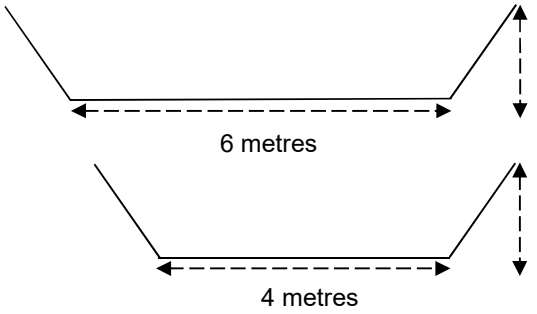
The three main objectives of drawing up rules for entering confined spaces are:
- The exclusion of risks when entering confined spaces;
- The minimisation of the use of independent breathing air during activities in confined spaces;
- Making rules unambiguous for the entire establishment at Sluiskil.

2. Definitions and exceptions

2.1. Definitions

A confined space is a space:
- which is not intended to be continuously occupied by employees;
- which is enclosed in character;
- which has limited or difficult access possibilities (including for emergency services);
- which has limited natural ventilation, and
- in which there is or may be a dangerous atmosphere.

What is an enclosed character?
- the effective total surface of the manhole(s)/trapdoor(s), intended for gaining entry to the confined space, is smaller than 1m^2
- and/or the effective height or width of the manhole/trapdoor is less than 60cm,
- if the floor is lower than 1.5m below the ground surface with limited natural ventilation and/or where a dangerous atmosphere prevails or may prevail. For clarification, we apply the rule of thumb that there is inadequate natural ventilation if the height/width ratio is >0.2.



1:6 = 0.16 (adequate ventilation / **not** enclosed in character)

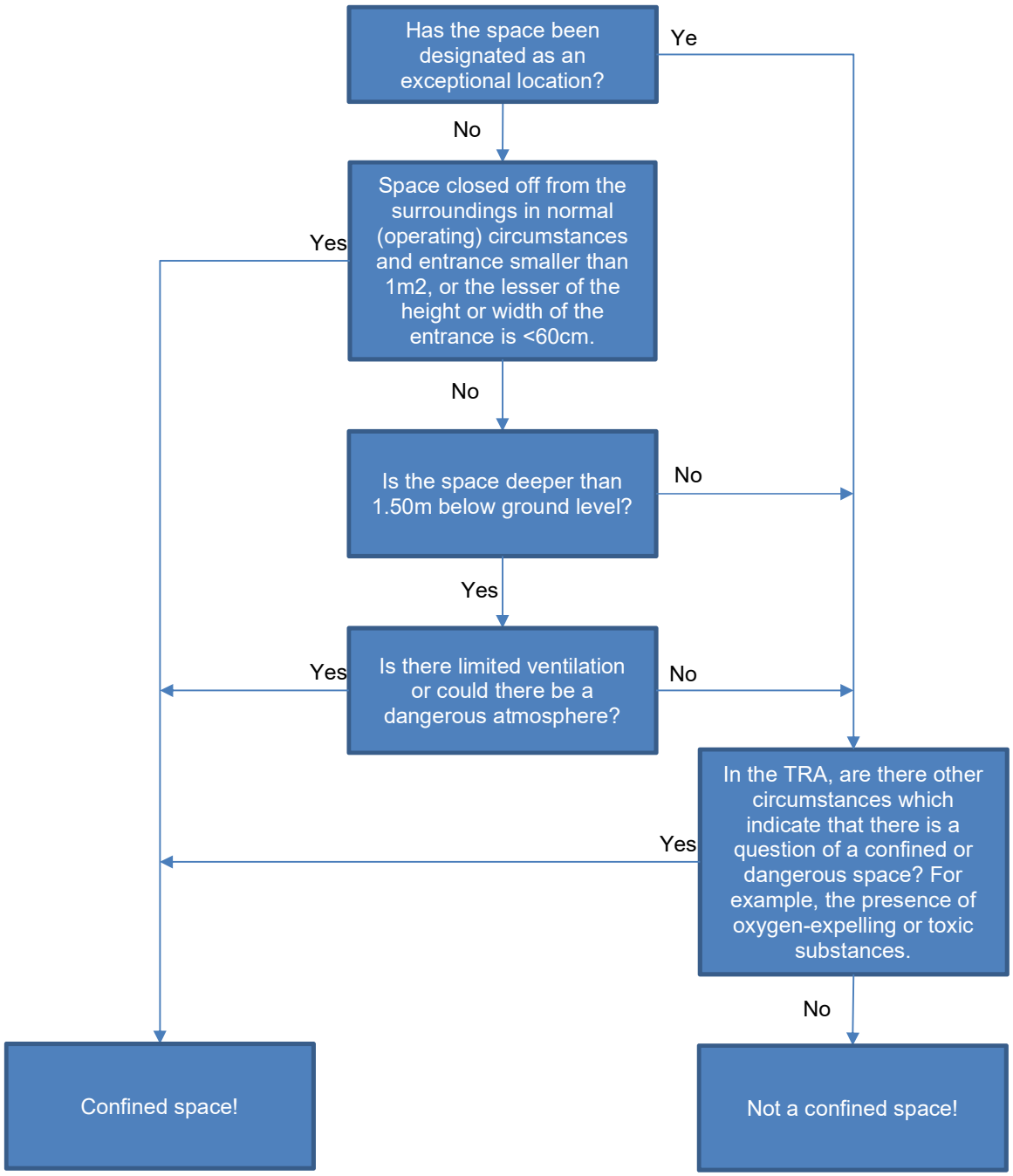
1:4 = 0.25 (inadequate ventilation / **is** enclosed character)

A dangerous atmosphere is defined as one which can give rise to:

- Intoxication
- Fire or explosion
- Suffocation

What is an entry?
One refers to an entry of a confined space when a person wholly or partially (with head or upper body) enters the delineated space in order to perform work or inspections.

The following flow chart can be used to determine a confined space:



2.2 Exceptions

The following locations have been designated as ‘exceptional locations’:

Nitrates Department:
- RAF462
- GLF 361
- GLF 461
- F361
- F304

Urea 5 Department:
- RAF 102 + Undercasing
- RAF 502 + Undercasing on condition that NH3 is sealed off and flushed.
- GLF 101 + Undercasing with TRA (e.g. locking mechanism of the doors)
- GLF 171

Urea 6 Department:
- RAF 601 + Undercasing on condition that NH3 is sealed off and flushed. TRA for Undercasing.

CES Department:
- Marley Pump sump
- Enclosure SR610
- Enclosure SR710
- Enclosure SR710A
- Hot well sump PP4
- Pump sump P207
- F732 A to F inclusive
- F701 A to C inclusive
- F912 A to F inclusive
- Cable tunnel near track SLU-ALG-C-T003
- E913 A to E*

* One of the operatives must always be present outside, and the O2 meter must accompany the person entering inside.

Reforming C all ventilators of:
- E321, E322, E366

Reforming D all ventilators of:
- E-409, E-417, E-424, E432, E-435, E-436, E437, E-439, E-440, E-441, E-443, E-445/E449, E447, E-482, E-484

Reforming E all ventilators of:
- E-509, E-517, E-524, E-532, E-535, E-536, E-539, E-540, E-541, E-543, E-545/549, E-547, E-582, E-584

OBL:
- Enclosure SR150
- Enclosure ammonia globes
- F-160, F-161, F-166/169, F-264, F-260, VV-150 (E-153), VV-151 (E-154)

Logistics & Offloading Department:
- Inspection of holds of sea-going vessels/lighters, if in accordance with HAE-025285.
- Sifting silos F SV 213 / 214 / 215/ 216
- Enclosure SR7AB, SR8, SR101AB

3. Measures to be taken entering confined spaces

3.1 General precautionary measures

- Every opened manhole must immediately be provided with a physical cover (such as mesh netting, and sealed by production dept.), and with a sign saying 'Danger, confined space' or similar text. For an example and order number, see HAE-027319.
- Supply systems for hazardous or oxygen-expelling substances must be sealed off, documented and verified by means of (e.g.) the blinding plate list (the sealing off at the location of the B.L. of the plant concerned can suffice if there is no danger of evaporation).
- Before entering a space, a Task Risk Analysis must always be performed. The Task Risk Analysis establishes whether there actually is a question of a confined or dangerous space, and, depending on the findings, supplementary provisions can be specified.
- On every occasion when a confined space is entered, a guard must be present outside (see tab 5).

For every entry (including the first entry) the following appropriate documents must always be available and present:

- Work permit and the previously discussed TRA.
- Signed rescue plan.
- Detailed drawing of the confined space.

The following provisions should be made:

- Means of communication between the outside guard and the man in the drum, and the possibility of direct communication from the outside guard to the listed personnel of the department concerned.
- Working O_2, CO_2 or NO_2 meter. (Not in the event of obligatory wearing of breathing air unit).
- During hot work, a functioning EX meter.
- Wearing of anti-fall harness (hook on back side) with lifeline. If a lifeline would result in increased risk, use of it is not mandatory, but this should then be mentioned in the TRA.
- When using independent breathing air provided by a breathing-air cart, then, if monitoring cannot be carried out by the outside guard at the manhole, a second person must be present in order to monitor the breathing air supply. If supply reaches a minimum level, the outside guard warns the user. This stipulation also applies if the breathing air user is not able to hear the minimum signal himself, if the breathing air is being used for a purpose other than for entering a confined space.

3.2 First entry and release of a confined space

Before carrying out activities in a confined space in which hazardous or oxygen-expelling substances may be present, a first entry should take place, and a release. This first entry is always to be carried out by a Yara employee, or by a person appointed by Yara who has the certificates and training specified as mandatory for a person making the initial entry (see below).

Criteria for determining whether or not breathing air protection must be worn during the first entry:

Substances	First entry with breathing air?
Presence of hazardous substances cannot be excluded.	Yes
Presence of oxygen-expelling substances cannot be excluded.	Yes
Not clear.	Yes
Above-mentioned substances can be excluded + ambient air 20.9% oxygen.	No

Person carrying out first entry should be in possession of:

- the 'breathing-air mask wearer in industrial situations' certificate.
- the internal instructions on 'explosion- and other meters' (see HAE-025445).

- the internal instructions on 'release of confined space' (see HAE-028220), and have a thorough knowledge of the procedure for 'working in confined spaces and dead corners'.

Person carrying out first entry enters the confined space and conducts the following measurements at relevant locations (taking account of possible dead corners) and in function of the established risks (see TRA):
- O2 concentration in volume-%.
- Explosivity of the atmosphere (% LEL).
- Concentration of hazardous substances which may possibly be present (in so far as possible and necessary).

The release of the confined space for use without recourse to use of breathing air can only take place if:
- The O_2-concentration in volume-% = 20.9% (taking account of the measuring tolerance).
- Explosivity of the atmosphere < 10% LEL.
- The concentration of hazardous substances which may possibly be present is below the threshold limit value.

Person carrying out first entry supplies this info to the issuer of the work permit.
Depending on the O2 concentrations, the % LEL or the concentrations of hazardous substances, different measures are necessary (see § 3.3).

3.3 Use of independent breathing air during activities in confined spaces

3.3.1 Confined spaces containing hazardous substances
This situation applies when:
- threshold limit values for hazardous substances are exceeded;
- one is nearing threshold limit values and (sudden or temporary) excesses cannot be excluded;
- substances – even below the threshold limit values – are experienced as very unpleasant by those entering the space;
- it cannot be excluded that the person entering the space may, in some other manner, be exposed to hazardous substances in excess of the threshold limit value.

Such an entry should then be carried out using independent breathing air.

Additional control measures deriving from the TRA may be prescribed, and are binding.

3.3.2 Confined space containing oxygen-expelling substances
This situation applies when:
- the O_2 concentration is lower than 20.9%
- it cannot be excluded that the person entering the space may be exposed, in some other manner during the activities, to a reduced O_2 concentration

Such an entry should then be carried out using independent breathing air.

Additional control measures deriving from the TRA may be prescribed, and are binding.

3.3.3 Presence of O_2-expelling and/or hazardous substances
Under these circumstances, activities may take place without the use of independent breathing air provided that the nature of the activities is such that no oxygen-expelling or dangerous or explosive vapours can be released.

This must also be evaluated in the TRA, in which the control measures (including possible use of breathing air) are determined. These additional control measures deriving from the Task Risk Analysis are binding.

3.4 Dead corner

Those zones in a confined space which do not lie within the direct flow direction between two ventilation-openings are referred to as dead corners. To illustrate the definition of a dead corner, a drum with two ventilation-openings is reproduced: one at the top of the tank and one at the right-hand side. The space on the left next to the opening at the top and the space under the manhole on the right-hand side are designated as dead corners. Also, the section at top right can be designated as a dead space. It is of course up to the person who has to enter the space to determine which zones are designated as dead corners. This will differ for every confined space, and must be evaluated using one's common sense!

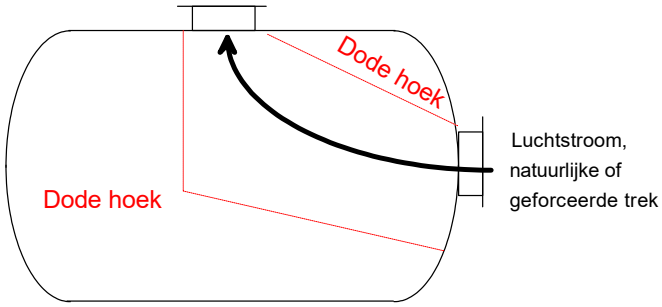


Illustration of the dead corner concept.

If many dead corners are present, extra attention will have to be paid to ventilating the space well.

4. Use of power tools in conductive confined spaces

Within Yara, the NEN3140 guidelines should be followed:

- Power supply for lighting < 50V alternating current or <120 V direct current.
- Set up welding apparatus outside the confined space; arc voltage < 50 V alternating current or <120 V direct current.
- Use of battery-powered tools is mandatory. If this is not possible, and only in consultation with Yara, use should be made of double-insulated tools which may only be connected to a so-called S-chain, under which circumstances the protection transformer must not be situated in the conductive space. Also, only 1 appliance may be connected per transformer.

For the standard text, please refer to the compilation 'Operational management of electrical installations - Low voltage' article 6.101.1 'Activities in narrow conductive spaces' on page 43 et seq. The standard text NEN3140 dated 2011 is included in the compilation mentioned.

5. Outside guard

If there is a question of working in a confined space, the outside guard must comply with the following requirements:

- Be 18 years old at minimum.
- Should have knowledge of at least the Yara procedures HAE-026168 Work Permit System, working in confined spaces, and the emergency plan HAE-028295.
- Possess a valid training certificate as 'Outside guard'.
- Possess an HSE (basic safety) certificate.
- Possess a valid EX-OX-TOX gas measurement training certificate.
- Be proficient in written and spoken Dutch.

5.1 Tasks of the outside guard

- Before commencement of the activities, discuss the applicable safety regulations with the client.
- Check for a work permit, TRA, rescue plan and equipment drawing.
- Maintain a registration of the persons who enter and leave the confined space. See attached blank registration form.

Aanwezigheidsregistratie.pdf

- Make daily reports and in the event of observed deviations, make an incident report.
- Maintain continuous contact with the persons in the confined space(s) by means of agreed signals, radio telephone or otherwise.
- Before the commencement of every entry, and after a pause, carry out a measurement.
- Monitor breathing air supply and ventilation systems (if applicable) during the entry. If the distance is too great, there must be a 2nd person stationed at the breathing facilities.
- He must not leave his work area unless he is relieved by someone who is completely familiar with the task concerned.
- Must ensure that when people temporarily leave the confined space, the power supply to the welding clips is disconnected and the gas supply is turned off and the gas hoses are brought outside. The lighting can remain switched on. If the safety guard too leaves the workplace, the 'confined space' sign should be put in place and the physical cover and mesh netting should be sealed over the manhole(s).
- Lend assistance in keeping the workplace orderly and tidy, without neglecting his primary task.
- Take care that the hose and cable connections do not become disconnected during the work.
- Take care to ensure the correct use and placing of the detection equipment.
- Take care to ensure that the correct personal protective equipment is worn.
- Pay continual attention to the surroundings and warn the persons in the confined space(s) of any special incidents, such as alarm signals from the emergency public address system and (alarm) signals from detection equipment. In such a situation, he should immediately see to the evacuation of the confined space and supervise this.
- Stop unsafe activities, and take preventive measures relating to the entry.
- Supervise compliance with the general and specific safety regulations.
- Summon assistance.

In emergency situations, or in the event of a threat thereof, the outside guard should:

- immediately report this to the permit issuing point, specifying the location and the nature of the emergency situation, making use of agreed means of communication;
- warn the persons in the immediate vicinity, maintain contact with the persons in the confined space and inform them that help is on the way;
- remain outside the confined space. Even if someone in the space is overcome (e.g. by fumes or lack of oxygen), or calls for help, he must never enter the confined space;
- he should render assistance to the expert service, if this is requested.

After the entry has been terminated, the outside guard should:

- check whether all cables and hoses have been removed;
- replace the physical cover over the manhole and seal the mesh netting over it, together with the warning sign 'Danger, confined space', and
- report termination of the entry to the coordinator, hand in the entry list.

5.2 Application for outside guard

5.2.1 General
- Engage for a minimum of 8h00 per day
- Cancellation of services can take place without charge if notification is given 24 hours before commencement of task.
- Yara provides accommodation and means of transport on the site.
- In overtime situations after 5.00 p.m. and after more than 2 hours of overtime per period of service, Yara should provide a meal.

5.2.2 Planned
- Services must be applied for at least 48 hrs. before the commencement of the assignment, via SAP
- An assignment for Saturday or Sunday should be applied for at the latest by midday on the Thursday preceding the weekend.

5.2.3 Not planned
- During daytime working hours: apply for services via the 'urgent' box of Supply Management (and/or make telephone contact with Supply Management) (HAE-026901). At that moment, the necessary safety guard(s) will be sought out.
- Outside daytime working hours: apply for services via telephone number 010- 4373455 (duty planner G4S).
- In the Nitrates / Urea / Offloading departments there are also members of the production staff who have been trained. In consultation with the on-duty Production coordinator, one can investigate whether they are present and can be deployed.

Also, an employee of Marine Service is certified and on stand-by duty; this person can be called in via the Maintenance service.