

# **CODE OF GOOD PRACTICE FOR HUMANE KILLING IN FOXES**

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## 1. Preface

The present code of good practice aims at providing the highest standards of welfare for farmed foxes (Blue fox *Vulpes lagopus*, Silver fox *Vulpes vulpes* and their colour variants and crossings) in killing. This code of good practice is prepared in line with the latest scientific and practical assessments. Therefore, this code of good practice can be used as an instructive tool for the operators, when planning and reporting the killing procedures. These guidelines can, however, be considered to be a work in progress with new editions warranted as results of new scientific studies are published.

There are many acceptable killing methods available for foxes. However, other methods than electrocution are rarely used in killing of foxes, and little or no scientific information is available on the proper methods and conditions of other killing methods. Therefore this code of good practice mainly concentrates on electrocution and it is recommended to be used as a primary method in killing of foxes.

This code of good practice presents practical examples for proper humane killing of foxes with electrocution according to the council regulation (EC) No 1099/2009. However, it should be noted that the member states of EU are also allowed to apply national regulations that are not necessarily described or taken into account in this code of good practice. Moreover, the interpretation of the council regulation, competent authorities and implementation practices of regulation may vary between EU countries. Therefore, it is necessary follow the implementation practices and legislation of that particular country, where the farm is operated.

Implementation and commitment at European level can be recommended.

## 2. Definition of killing

A word **killing** means any intentionally induced process which causes the death of an animal. A “good death” or “humane death” would be one that occurs with minimal pain and distress. In the context of the present guidelines, killing should be considered as an act of inducing humane death in a fox. Killing techniques should result in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function. For readability’s sake the term “humane way of killing” is later in this good code of practice abbreviated as “killing”. However, the reader

should always bear in mind the underlying principles to avoid causing pain, distress and suffering both before and during the killing.

**Emergency killing** means the killing of animals which are injured or have a disease associated with severe pain or suffering and where there is no other practical possibility to alleviate this pain or suffering.

### 3. Council Regulation (EC) No 1099/2009

The present code of good practice is based on council regulation [\(EC\) No 1099/2009](#).

This regulation lays down rules for the killing of animals bred for the production of food, wool, fur or other products as well as the killing of animals for the purpose of depopulation and for related operations. The following concerns killing methods in fox:

Animals shall be spared any avoidable pain, distress or suffering during their killing and related operations. Business operators (i.e. farmers) shall, in particular, take the necessary measures to ensure that animals;

- (a) are provided with physical comfort and protection, in particular by being kept clean in adequate thermal conditions and prevented from falling or slipping;*
- (b) are protected from injury;*
- (c) are handled and housed taking into consideration their normal behaviour;*
- (d) do not show signs of avoidable pain or fear or exhibit abnormal behaviour;*
- (e) do not suffer from prolonged withdrawal of feed or water;*
- (f) are prevented from avoidable interaction with other animals that could harm their welfare.*

As well as general rules for handling of animals, the regulation states some specific rules for the use of each killing method. The stated rules for killing with electrocution are discussed in detail in [chapters 5, 6 and 7](#) of this code of good practice.

The council regulation does not only lay down the rules of how the animals should be handled during killing, but also emphasizes the meaning of education, competence and self-monitoring. Competence requirements of the persons involved in killing of foxes are discussed in [chapter 4](#).

The operators are obligated to plan in advance the killing procedure by drawing up Standard Operating Procedures. The business operator has to ensure that the killing is carried out according to the protocol. The effectiveness of killing has to be monitored by measuring different kinds of key parameters that are essential for successful humane killing. The key parameters stated in the regulation are discussed in further details in [chapter 8](#). The content of standard operating procedure and monitoring of killing procedures are discussed throughout this code of good practice and in further details in [chapter 10](#).

#### **4. Competence and certificate of competence**

The regulation No 1099/2009 of European council states:

*Killing and related operations shall only be carried out by persons with the appropriate level of competence to do so without causing the animals any avoidable pain, distress or suffering.*

*Without prejudice to the obligation set out in paragraph 1 of this Article, the killing of fur animal shall be carried out in the presence and under the direct supervision of a person holding a certificate of competence as referred to in Article 21 issued for all the operations carried out under his supervision. Business operators of fur farms shall notify the competent authority in advance when animals are to be killed.*

There should be a full responsibility of animal welfare by operator. The farm owner, the farm manager or other person responsible for the killing must have a certificate of competence for killing fur animals, and must ensure that everyone that is involved in the killing of animals is properly trained to do so. Killing and related operations shall be carried out by persons holding a certificate of competence or persons trained and supervised by persons with such a certificate. Handling of the animals must be done without causing the animals any avoidable pain, distress or suffering.

Certificates of competence are animal species specific, meaning that even if a person has a proper competence and a certificate for slaughtering e.g. sheep, when involved in killing of other type of

animal, the person has to achieve a certificate for this as well. However, member states of the EU must recognise certificates of competence issued in another member state.

In order to have a certificate for killing of foxes, a person must have proper education and pass a final examination concerning the killing of foxes. If a person has been involved in fox farming and killing for a long period of time (at least 3 years), the person is thought to have a certain level of experience. The member states are allowed to issue certificates by way of simplified procedure to such persons until 8<sup>th</sup> of December 2015.

As there are differences in implementation practises between EU countries, the national authorities and national fur breeders associations provide additional information about fulfilling of the competence requirement or notification obligations on a national level.

## **5. Killing methods for foxes**

The council regulation allows the killing of foxes to be done in different ways. The most used method is “head-to-body” electrocution. It is also possible to use “head-only” electrocution followed by immediate procedure to ensure death.

As well as by electrocution, the killing can be done with pure source of carbon monoxide and with carbon monoxide associated with other gasses. There, however, is no scientific evidence available on the effectiveness and humanity of gasification method in foxes. Therefore, the person responsible for the killing with this method must especially draw attention to the killing conditions and monitoring of the humane death if killing foxes with gas.

In emergency killing, foxes can be euthanized with penetrative captive bolt device followed by immediate procedure to ensure death or with a firearm with free projectile. If the fox weighs less than 5 kg, one can also kill an animal with a percussive blow to the head followed by immediate procedure to ensure death. However this method is not to be used routinely and can be used only if other stunning/killing methods are not available. Moreover killing by percussive blow to the head must not be performed to more than seventy animals per day per person.

### **5.1. Before killing**

*“Animals shall be spared any avoidable pain, distress or suffering during their killing and related operations”.*

Before killing takes place animals must be provided with physical comfort and protection. They must be kept clean and kept in adequate thermal conditions. The animals are to be protected from injuries, slipping and falling. Animals are to be handled and housed taking in to consideration their normal behaviour. The animals must not show signs of fear, pain or abnormal behaviour. They must not suffer from prolonged withdrawal of food or water. The animals are to be protected from other conspecifics and other animals that might harm their welfare. Killing is to be done with the least possible disturbance to other animals. Pelting should take place sufficiently far away from enclosures used for other animals so that these animals are not disturbed.

## **6. Killing devices**

Killing device manufacturers are obligated to give instructions concerning the proper use of equipment and optimal conditions. This helps the operator when preparing the instructions for the killing procedure and in evaluation of killing conditions. Equipment should always be calibrated and used according to manufacturer's instructions. For these reasons devices specially designed for killing purposes are recommended.

Proper function of the equipment must be tested before killing. The equipment must be maintained and checked in accordance with the manufacturers` instructions by persons with needed competence and a sufficient understanding of the equipment. Specifications for these qualifications are agreed between the authorities and the national fur breeders` association. The operator must have a record of maintenance procedures. The record must be kept for at least a year, and must be presented to a competent authority if requested. When concerning electronic killing equipment, all repair work should be performed by persons with a sufficient competence for electric work and understanding of the equipment.

The operator must be well-prepared in case of malfunction of the equipment. There must always be a back-up method for killing animals. The operator has to describe the actions to be taken in cases when the fox does not die as expected

### 6.1. Electrocution equipment

There are devices available for killing of foxes by electrocution that meet the requirements of regulation. The equipment contains two hand held electrodes with an on-off switch connected to a battery (12 V). The electric current passes through a fox once one of the electrodes has been inserted in fox's rectum and one electrode in to the mouth and the farmer pushes an on-off switch. The fox can be placed into the stand from the neck-tongs and tale, and in some models the electrodes can also be connected to an automated stand with a foot-operated pedal. If possible, the body of the fox should be supported from under the belly in order to reduce the strain on the neck and tail, and to prevent the spine from bending. However, at the moment, in most commercial stands there is no possibility to support the body. For the safety of operator and animals, the equipment is recommended to have a safety signal. To ease the monitoring of killing procedure and conditions the device is recommended to contain a meter and a display indicating the current (A) and voltage (V) (or at least current) when the device is in use. Some of the older killing devices that have been used until recently, do not necessarily meet the criteria for the killing of foxes set by regulation, and therefore they must not be used. According to council regulation a **minimum of 0.3 amperes and a minimum of 110 volts are to be used in killing of foxes.**

### 6.2. Gas killing devices

According to regulation foxes can be euthanized by using pure carbon monoxide gas or carbon monoxide associated with other gases, e.g. exhaust gasses from the motors. However, gasification method is rarely used with foxes and no scientific data on the proper features of gasification equipment designed for killing of foxes is available. Therefore the properties of equipment listed in following chapter are either clearly stated in the Council regulation or have been found to be functional with other animals (e.g. mink).

When using a gasification device, the operator must ensure that the chamber has enough space and that the fox does not injure itself while in the chamber. The gas inlet must be positioned in a way that it does not cause injuries or stress caused by too hot or cold gas. The gases from the motors must always be cooled and filtered before letting them enter the chamber. The gasification device must have a window, through which the operator can monitor the progress of euthanasia.

### 6.3. Other killing devices

Firearms used in killing of foxes must be of an appropriate calibre and type. The projectile should produce a rapid loss of consciousness and death, without causing any avoidable pain or suffering. The penetrative captive bolt device should also produce enough energy to penetrate the skull and cause loss of consciousness by damaging the brain.

## 7. Description of killing methods

### 7.1. Instructions for head-to-body electrocution

Electrocution of foxes can be performed with a hand held device or with an automated stand device. The fox should be restrained in a way that causes least possible pain and suffering for the fox, and in a way that it cannot injure itself.

With a hand held device, the animal is restrained by supporting the fox from the neck and tail and preferably supporting the body from the belly. The animal must not be hanged from legs before killing. Once the animal is restrained, the killing must take place immediately; the fox must not be restrained for a long time prior electrocution. The electrodes are placed in fox's mouth and rectum. According to council regulation a **minimum of 0.3 amperes and a minimum of 110 volts are to be applied for at least three seconds.**

When an automated device or stand is used, the fox is restrained to a stand from the neck and tail usually with neck tongs. Preferably, the animal is supported from under the belly to prevent the pressure and bending of the spine. The animals must not be restrained before the person in charge of the electrocution is ready to perform the operation. The electrocution must take place immediately once the animal is restrained. The other electrode is placed in the rectum and the other is connected to a pole in front of the stand. When the operator pushes a pedal, the electrode in the pole comes to contact with the foxes snout and mouth and the current passes through.

### 7.2. General instructions for head-only electrocution

The regulation permits a stunning electric shock to be given trans-cranially, but this method is not commonly used when killing foxes. This "head-only" method is only to be used as a stunning

method as it causes an epileptic seizure from which the animal can recover. Therefore it is necessary to **immediately** administer a head-to-body electrocution or some other treatment to induce a proper death. The actual killing must occur before the animal regains consciousness. The time, when the animal regains consciousness depends on the species and stunning method used. After a trans-cranial electric shock in slaughter animals (e.g. cows, pigs etc.) the recommended stun-to-stick time is usually within 10 to 20 seconds or even less.

Head-only stunning could be used as a precursor for the head-to-body electrocution in a so called two-step –electrocution to reassure that the animal is unconscious. The loss of consciousness is achieved with head-only stunning and head-to-body electrocution causes the death by heart fibrillation. However, if a head-only stunning is used, special attention should be paid when defining the key parameters as there is no scientific information available about the optimal conditions or effects of head-only stunning in foxes.

### **7.3. Killing with CO –gases**

According to regulation, killing of foxes can be performed with either 4% of pure carbon monoxide or with carbon monoxide associated with other gases, provided that the CO-concentration is at least 1 % (e.g. exhaust gases). As there is no scientifically verified information available on the proper conditions of gasification in foxes, the following instructions are based on the council regulation, Annex I of regulation and scientific information available from other species (e.g minks and dogs). Therefore the following instructions are regarded mostly as minimum requirements. For this reason, the operator must especially draw attention to the description and monitoring of killing conditions.

The minimum concentration must be achieved in the chamber before any animals are introduced. The animals must be introduced in to the chamber individually. The previous animal must be unconscious or dead before the next animals is introduced in to the chamber. The animals must be monitored the whole time. When using exhaust gases, the gas must be properly cooled, filtered and purified from any impurities in the gas mixture before letting the gas come to contact with animals. The motor and chamber must be checked yearly before the killing. After the last animal has been introduced in to the chamber, more gas must be led inside the chamber for as long as necessary to ensure that all animals are dead (a minimum of 3 minutes). Animals must be kept inside the chamber until they are all dead.

During the killing the key parameters are monitored. It is necessary to monitor the gas quality and success of filtration, carbon monoxide concentration, exposure time and temperature. In addition the behaviour of the animals (e.g. signs of distress, the time when the animals lose consciousness and die) and the filling of chamber are monitored during the procedure.

#### **7.4. Other killing methods**

Penetrative captive bolt can be used as a stunning method in killing of foxes. There is little scientific evidence about the effectiveness of this method in foxes. However, studies on the use of penetrative captive bolt in euthanasia of dogs have shown that when done in a correct manner and on the right position of the skull, the dogs lose consciousness immediately. Before killing begins, one should make sure that the position is correct. In dogs, the position can be determined by drawing a line from both lateral corners of the eye to the opposite ear. In addition, one must make sure, that the bolt gun produces a sufficient energy in order to penetrate the skull to cause sufficient concussion and disrupt the function of cerebral hemisphere and brain stem. After firing the bolt, one should ensure the death of an animal by using a method to ensure death. According to Council regulation such methods are for example bleeding, pithing, electrocution or prolonged exposure to anoxia.

According to regulation, firearm with a free projectile is an acceptable method for killing of foxes. Firearm should be chosen taking in to consideration the size of an animal and morphology of the skull. Preferable location to shoot is the head. The projectile should enter the brain and cause sufficient brain damage without exiting from the other side of the head.

Temporarily, foxes weighing less than 5 kilograms can be killed by percussive blow to the head. However, this method is not to be used routinely, and is only allowed to be used if no other killing method is available. A maximum number of killed animals are 70 animals per day per person. There is no scientifically proven information about the correct position of the blow or the effectiveness of this method in foxes. However, in many other animals, a single sharp blow to the center of the skull, with a sufficient force will induce a concussion and loss of brain function. This method requires training, skills and experience, but when done properly, it causes a rapid loss of consciousness. If the animal does not die, but merely loses consciousness, the death of an animal must be ensured by using other killing methods such as bleeding, pithing, electrocution or prolonged exposure to anoxia.

## 8. Monitoring of killing efficiency

The operators are obligated to plan in advance the killing procedure by drawing up Standard Operating Procedures. The business operator has to ensure that the killing is carried out according to the protocol. The effectiveness of killing has to be monitored by measuring different kinds of key parameters that are essential for successful humane killing.

Killing of animals may induce pain, distress, fear or other forms of suffering to the animals even under the best available technical conditions. Any person involved in the killing of animals should take the necessary precautions to avoid pain and minimize the distress and suffering of animals during killing procedure.

The monitoring of killing efficiency is typically based on the evaluation of consciousness and sensibility of the animals.

**Consciousness** can be considered animal's ability to feel emotions and control its voluntary mobility. An animal can usually be presumed to be unconscious when it loses its natural standing position, is not awake and does not show signs of positive or negative emotions such as fear or excitement.

**Sensibility** can be considered animal's ability to feel pain. An animal can usually be presumed to be insensitive when it does not show any reflexes or reactions to stimulus such as sound, odour, light or physical contact.

When performed properly, "Head-to-body" electrocution affects the brain by immediately inducing an epileptiform state that causes tonic and clonic muscle spasm, unconsciousness and eventually brain death (within 5 minutes). Electrocution affects the heart by inducing an immediate fibrillation and cessation of heart at latest within minutes. Since the fibrillating heart cannot produce sufficient blood flow to the brain this leads to hypoxia in the brain and brain death. The animal is unconscious during the whole procedure.

When the kill is successful, the respiration ceases immediately after electrocution.

In order to ensure the appropriate conditions for successful killing, the operator must define the key parameters set out in the council regulation [\(EC\) No 1099/2009](#) and perform regular checks to make sure that the killing procedure proceeds according to defined conditions. The frequency of checks depends on conditions affecting the killing efficiency and the results of previous checks. The death

of animals must be checked before pelting. Individual checking can be done by testing the muscle tension, corneal reflex, checking the heart beats and cessation of respiration (sf. chapter 8.2).

Farmers should keep a record of performed checks on proper death and key parameters.

## 8.1. Checking the key parameters

The key parameters for each killing method are stated in the council regulation. These parameters are the key factors affecting the success of good killing process. The following chapters describe parameters for each method used in killing of foxes.

### 8.1.1. Electrocutation

According to council regulation the operator has to define the key parameters and perform regular checks on them during the killing procedure. The frequency of checks depends on the results of previous checks and all factors affecting the efficiency of killing.

Table 1. The key parameters to be checked when killing foxes with “head-to-body” electrocutation.

Parameter	Head-to-body electrocutation
Minimum current (A or mA)	<ul style="list-style-type: none"> <li>• 0.3 A</li> </ul>
Minimum voltage (V)	<ul style="list-style-type: none"> <li>• 110 V</li> </ul>
Maximum frequency (Hz)	<ul style="list-style-type: none"> <li>• Defined by the manufacturer (100 Hz in most recent models of appliances)</li> </ul>
Frequency of calibration of the equipment	<ul style="list-style-type: none"> <li>• At least once a year</li> <li>• Charge of the battery as many times as necessary – during killing at least daily</li> <li>• A meter and display connected to the equipment helps to monitor the proper function</li> </ul>
Minimum time of exposure(s)	<ul style="list-style-type: none"> <li>• <math>\geq 3</math> sec, (<math>\geq 5</math> sec recommended)</li> </ul>
Optimisation of the current flow	<ul style="list-style-type: none"> <li>• The correct placement and holding pressure of electrodes</li> <li>• High enough voltage and amperage in relation to body size</li> <li>• Physical environment and prevention of miss-conduction</li> </ul>
Prevention of electrical shocks before stunning	<ul style="list-style-type: none"> <li>• On-off switch</li> <li>• Shelter from rain and moist</li> </ul>

	<ul style="list-style-type: none"> <li>• Non-conducting materials in restraining device</li> <li>• Cleanness of the environment</li> </ul>
Position and contact surface area of electrodes	<ul style="list-style-type: none"> <li>• One electrode to the rectum and the other to the mouth. Rod shaped electrodes transfer the current accurately.</li> </ul>
Maximum stun-to-stick/killing time	<ul style="list-style-type: none"> <li>• If electrocuted properly, death occurs within minutes with head-to-body electrocution.</li> <li>• If a two-step stunning method is used, final killing should be performed without delay</li> </ul>

### **Minimum current and voltage and maximum frequency**

When the voltage is kept constant, the achieved current (A) will depend on the tissue resistance, e.g. impedance. The resistance increases with increasing body size and fur covering, but decreases with voltage, contact surface, skin moisture and the pressure used to hold the electrodes. The voltage of the electric shock must be sufficiently high in order to overcome the tissue resistance. When “head-to-body” electrocution is used, the current causes a heart fibrillation or cardiac arrest and epileptic seizure in the brain. When using alternating current (AC), the impact on the heart depends on the frequency of the current; lower frequency is better than high frequency.

If the current is too weak to induce an epileptic shock or the current does not for some reason pass through the brain, the animal may remain conscious and may therefore experience the electrocution. The animal will be paralysed while electrocuted and it may remain paralysed for some time after electrocution while still conscious. Cardiac arrest is described to be very painful in humans, and muscle contractions caused by the seizures can be forceful enough to fracture a spine.

### **Minimum time of exposure**

The fox should be exposed to the electric current for at least 3 seconds. It has been proven that if the exposure time is less than 3 seconds, the fox can experience the heart fibrillation and seizures, and still regain consciousness. However, manufacturer’s instructions for the use of equipment and exposure time should be followed, especially when the recommended exposure time is more than three seconds. Large sized foxes may have to be exposed to current more than three seconds, since the size of the fox increases the resistance.

### **Frequency of calibration of equipment**

Manufacturers are obligated to inform the technical information of the killing apparatus and give instructions for the proper use of equipment when purchased. The manufacturer is also obligated by regulation to make the instructions publicly available via the Internet. The operator must ensure that the equipment is maintained and checked according to manufacturer's instruction by persons who have sufficient competence and understanding to do so. Before beginning killing it should be made sure that the apparatus produces sufficiently high current and voltage with a sufficiently low frequency, and that the battery is in a good condition. The battery should be charged or changed sufficiently often, depending on the number of animals killed. A meter and a display connected to the equipment help the operator to monitor the condition of the equipment, as the reduction of charge and malfunction of equipment can be easily seen as a change in current.

In case of malfunction, the electrocution equipment is repaired by licensed professionals trained for that purpose.

### **Optimization of current flow**

The position of the electrodes, shape of the electrodes and the pressure used to hold electrodes affect the efficiency of electrocution. It has been found, that when one electrode is placed properly inside the rectum and one is bitten by the fox, the current passes through the fox properly. The rod electrodes should be placed sufficiently deep in to the rectum and firmly in to the mouth. The current induces epileptic seizures in the brain and fibrillation or cardiac arrest of the heart. It should be checked that the restraining device or other materials in contact with the fox do not affect the path or effectiveness of the current flow. Many physiological properties affect the current flow, such as the body size. Therefore the voltage and amperage should be sufficiently high for the current to overcome the body resistance of even the largest of foxes.

### **Prevention of electrical shock before stunning**

Electrical shocks before stunning must be prevented. Shocks can be prevented by using proper equipment designed for killing purposes that are equipped with an on-off button. This way, even if the electrodes were attached beforehand, the current does not pass through before the operator pushes the ignition button. Moreover, the electrodes should be connected into an animal only after the animal is properly restrained. A hesitant or negligent behaviour by the operator can cause accidental electric shocks before actual stunning. Therefore, a proper knowledge and experience on

the use of killing equipment is necessary. Other physical factors affecting the electrocution must be taken in to account, e.g. that the wires are undamaged or that the environment does not contain any conducting materials that can accidentally cause electrocution. The environment where the killing takes place must be sheltered from the rain, clean and must not contain conducting materials (e.g. wet floors or other wet levels, loose conducting strings or metal wires etc.)

### **Position and contact surface of electrodes**

Positioning of the electrodes affects the route of the current flow. In order to induce unconsciousness and cardiac arrest/heart fibrillation, the electrodes must be placed in a way, that the current passes both the brain and the heart. In head-to-body electrocution one of the electrodes is placed sufficiently deep into the rectum and one electrode is placed into the mouth. In this position the current affects both the brain and heart. The effects of electrodes in other head-to-body positions, e.g. head to leg, have not been studied and are therefore not recommended. Rod shaped electrodes pass through current efficiently when placed correctly.

In case head-only stunning is used, the electrodes must be placed on both sides of the skull in order to obtain a sufficient current flow through the brain. The rods must be placed firmly on to the skull.

### **8.1.2. CO-gases**

The key parameters for each gas agent are stated in the council regulation's Annex I. These parameters are the key factors affecting the success of good killing process. As there is no scientific information available on the effectiveness of gas killing method in foxes, the following parameters are regarded as minimum requirements. The operator must especially pay attention in defining the appropriate conditions before the killing begins. The parameters for each gas method used in killing of foxes are presented in table 1.

Concentration and exposure time primarily affect the efficiency of killing, where as the quality of gas, temperature inside the chamber and filtration of emission gases have an impact on the quality aspects of euthanasia. One must keep in mind, that death always takes longer when using gas euthanizing agents than when using methods that induce an instant loss of consciousness and death (e.g. electricity). The set quality parameters aim to ensure, that the conditions during the killing are the best possible, while the animal is still conscious and that they cause as little pain, distress or suffering as possible.

Table 1. The key parameters to be checked when killing foxes with CO-gases according to regulation.

Parameter	Pure carbon monoxide	Exhaust carbon monoxide
Gas concentration	Yes ( $\geq 4\%$ CO)	Yes ( $\geq 1\%$ of CO) <sup>1</sup>
Duration of exposure	Yes	Yes
Quality of gas	Yes	-
Temperature of gas	Yes <sup>2</sup>	Yes
Filtration of gas	-	Yes

<sup>1</sup> Concentrations higher than 1% are recommended

<sup>2</sup> Not an essential problem, but should be monitored

According to council regulation the farm operator has to define the key parameters. The operator must perform regular checks on them during the killing procedure. The frequency of checks depends on the results of previous checks and all factors affecting the efficiency of killing.

### **Gas concentration**

Gas concentration and exposure time are key factors affecting the effectiveness of the killing process. The gas must first enter lungs, and pass through in to the blood stream. The higher the concentration of gas in the air, the quicker the acquired concentration in the blood stream is achieved. Therefore, there should be a possibility to evaluate the concentration of gas inside the chamber, in order to predict the appropriate exposure time. Unfortunately, at present, no scientific studies on the appropriate gas concentration and exposure time in killing of foxes have been made. Minimum concentrations of gas are stated in regulation (Table 1), but due to lack of scientific information on foxes, the operator must bear in mind, that concentrations higher than recommended may be needed to secure a humane death.

The frequency of checks of concentration depends on previous checks and conditions affecting the concentration. The concentration of gas is recommended to be checked at least when testing the killing equipment and protocol, and once or more during killing if necessary. Otherwise, the proper concentration is monitored by visually observing animals (see [chapter 8.2](#)). Exposure time to the gas before reaching unconsciousness should be as short as possible. The sooner the fox loses consciousness the less it experiences possible pain, distress or suffering. The exposure time is calculated by visually observing the animal and noting time when the animal is first exposed to the

gas till the time when it loses consciousness and when it dies (see chapter [8.2](#)). Checking the death merely by visual observation can be difficult, but when the breathing stops, other vital functions will cease shortly after due to anoxia.

### **Quality of gas and filtration of gas**

Impurities in the gas can cause irritation in respiratory organs and eyes. Therefore, the operator must carefully monitor the quality of gases. The operator must make sure that the exhaust gases from the motors are properly filtered, and they shall not contain any essential impurities. If not filtered, the exhaust gases contain on average less than 1 % of impurities. However, the type of motor, the condition of the motor and the type and quality of the fuel affect the amount of impurities the motor produces. Impurities can be reduced by selecting a proper motor and efficient filter. Filters can be for example commercial filters, glass wool or hay. Commercial filters are recommended. The amount of impurities is recommended to be checked at the yearly check of the motor and the efficiency of the filter selected accordingly. The efficiency of filtering is evaluated during killing by regularly observing the behaviour of the animals as well as the dirtiness of filter (see [chapter 8.2](#)). The filter must be changed if it seems dirty and/or the filtering efficiency seems diminished. Changing interval is dependent on the type of motor, the intensity of use and filter used. The manufacturer of the equipment may also provide information about filtering and its' changing frequency, that should be followed.

Gas manufacturers are mainly responsible for the purity and quality of commercial gases, whereas the responsibility of the farm operator is to purchase the gas, best suited for killing the animals. The farmer can evaluate the purity of the gas during killing by observing the behaviour of the animals (see [chapter 8.2](#)).

### **Temperature**

Too hot or too cold temperature may also cause pain and distress. Emission gases from motors can be very hot, and they have to be properly cooled. The inlet has to be positioned and gas led in the chamber in a way that the animal does not injure itself, and that the gas does not cause excitement. Too high or low temperatures are generally not an essential problem with cylinder CO gas, but according to regulation it should also be monitored.

In addition, the animals themselves produce heat. Because the chamber is well sealed, it also reduces the heat loss, thereby increasing the temperature inside the chamber. The temperature inside the chamber should be monitored.

### **8.1.3. Other killing methods**

When killing foxes with a firearm, the main parameters affecting the success of killing are position of the projectile entry, calibre and efficiency of the projectile and the type of ammunition.

When using a penetrative captive bolt device the main parameters are the position and direction of the bolt, appropriate velocity and exit length and diameter of the bolt, which should be selected according to the size and species of the animal. In addition the maximum stun-to-stick/kill time must be monitored.

When killing foxes with a percussive blow to the head, the main parameters affecting the success of killing are the position and force of the blow.

## **8.2. Behavioural indications of death**

### *Electrocution*

Regular checks are made for any signs of life (i.e. that the fox is not breathing and the heart has stopped). Breathing should cease immediately after electrocution. If electrocution has not been administered sufficiently long or the current or voltage has been too low, the animal may recover from electrocution, which may be seen as a recovery of heartbeat and rhythmic breathing. In addition there may be attempts to visual observation of the environment and movement.

It is difficult to evaluate the level of consciousness/sensibility just by observing the animal. The level of consciousness can be tested by testing whether or not the animal reacts to external stimuli. This can be done by testing pain related reflexes, e.g. pedal pain withdrawal reflex, and palpebral or corneal reflexes from the eye. Pedal reflex can be tested for example by pinching the skin between the toes. Palpebral reflex is tested by gently touching the corner of the eye. Corneal reflex is tested by touching the eye very gently with a cotton swab or a finger.

In most cases all the muscles of an animal are relaxed after electrocution. In some cases the animal may experience some involuntary movement (e.g. twitching) of limbs and facial muscles shortly

after electrocution, which is due to electrocution induced clonic muscle spasm. However, excessive movement, seizures, coughing, or distressed vocalization are signs of improper death.

If any of the tested foxes show any signs of life or any other signs related to distress, pain or suffering, the operator has to kill the animals as quickly as possible by re-administering the electrocution or by using other alternative killing method. Thereafter the equipment has to be checked and adjusted (calibrated) before killing any more foxes with the equipment in question.

### *Gasification*

Inhaled CO first affects brain and brainstem, which can be seen as loss of electroencephalography (EEG) and brainstem auditory evoked responses (BAER). Thereafter, respiration and heart rate are affected. Because sensitivity to pain is essentially related to consciousness and function of brain, CO gases can be generally considered to primarily and effectively lead to a state of non-pain. However, it should be noted that there are no scientific studies on the affects of CO gas in foxes, and the following instructions and descriptions of behavioural indications of death are based on the knowledge of the physiological and behavioural effects of CO in other species such as mink.

In other animals, typical behaviours before death are activity/restlessness, hyperventilation, uncoordinated movement and recumbency. When killed with carbon monoxide gas, the animal soon starts to hyperventilate after it is placed in to the gas chamber. Carbon monoxide reduces the oxygen level of blood, causing the increase in breathing frequency. In appropriate gas concentrations animals typically become recumbent quite quickly (e.g. mink ca. one minute), when killed with CO. The animal is unconscious when it still breathes, but is otherwise immobile; the animal is recumbent, has lost muscle tension and does not react to environmental stimuli. The animal is dead when it has stopped breathing and the heart has stopped. It is difficult to check the death of an animal just by visually observing the animal, and the death should always be checked after the animal is taken out of the chamber.

It is difficult to evaluate the level of consciousness/sensibility just by observing the animal. However, the level of consciousness can be tested by testing whether or not the animal reacts to external stimuli. This can be done by testing pain related reflexes, e.g. pedal pain withdrawal reflex, and palpebral or corneal reflexes from the eye. However, testing these reflexes during the gas killing can be impractical and even dangerous for the operator. Therefore, the easiest and most practical way to make sure that the unconsciousness and death are achieved humanely is to make

sure that the gas concentration and exposure times are sufficient, and the behavioural signs of unconsciousness and death are observed regularly.

When the gas chamber is emptied, regular checks are made for any signs of life (i.e. that the fox is not breathing and the heart has stopped). If any of the tested foxes show any signs of life, it and all other animals alive have to be properly euthanized, and the necessary measures have to be taken to adjust and fix the killing equipment.

Unconscious animals may experience involuntary movement (e.g. twitching). However, excessive movement, seizures, coughing, or distressed vocalizing may be signs of improper euthanizing conditions. If the animal shows these or any other signs related to distress, pain or suffering, the operator has to euthanize the animals as quickly as possible, by using back up euthanizing methods planned and written in the standard operating protocol. Thereafter if the equipment is faulty it has to be repaired, checked and adjusted (calibrated) before killing any more foxes with the equipment in question.

## **9. Emergency killing**

The standard operating procedure is planned and carried out in order to reduce the risks of unsuccessful death of an animal, and to improve the welfare of an animal during the killing procedure and related procedures. However, even if the standard operating procedure is followed accurately, there is always a risk of malfunction of the equipment. The operator has to state in the standard operating procedure instructions for the appropriate measures to be taken in case of malfunction of the equipment. The person in charge should always have fully functional killing equipment as a backup. In case electrocution equipment is not available, the emergency killing can be done by penetrative captive bolt device followed by immediate method to ensure death, by shooting, or if the fox weights less than 5 kg, by percussive blow to the head (For descriptions of methods see chapter 7).

## 10. Standard operating procedures and reporting

The council regulation states:

*Business operators shall plan the killing of animals and related operations in advance, and shall carry them out in accordance with standard operating procedures.*

*Business operators shall draw up and implement such standard operating procedures to ensure that killing and related operations are carried out in accordance with Article 3 (1).*

The business operator is obliged to plan the killing of animals and related operations in advance by drawing up standard operating procedure. Upon request the standard operating procedure has to be made available to the competent authority. The standard operating procedure has to:

- *take in to account manufacturers' recommendations*
- *define for each stunning method used, on the basis of available scientific evidence, the key parameters ... ensuring their effectiveness to stun the animals*
- *specify the measures to be taken when the checks ... indicate that an animal is not properly stunned ...*

The business operator has to make sure, that the daily killing operations are carried out in accordance with the standard operating procedure. The operator has to plan and document the follow-up of killing procedures, in order to prove that the killing has been carried out according to the standard operating procedures. The report of checks should include at least the following:

- Name of the person/s responsible for killing
- A copy of the certificate of competence or names of the persons holding a certificate
- Date/s, starting time and ending time of the killing
- Results of parameters and check-ups
- Report of the equipment check-ups and possible service information

An example of the control report is presented in appendix [3](#).

The authorities must be informed about the beginning of killing of foxes in advance. Killing equipment has to be checked before the killing begins. The reports concerning the condition and service procedures of the killing equipment have to be kept at least for a year, and upon a request they have to be presented to the competent authority.

If the authority in question finds that the statements of the regulation have been breached by the business operator or other persons involved in killing procedures, the authority has the right to:

- require business operators to amend their standard operating procedures and, in particular, slow down or stop the production
- require the business operators to increase the frequency of the checks referred to in Article 5 [checks for proper stunning and death]
- suspend or withdraw the certificate of competence

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## **Appendix 1. A simplified example of Standard Operating Procedure**

### **(a) Responsible operator:**

Write down name of persons who are responsible for killing of animals.

Check certificate of competence.

Make a plan for controlling and supervision of the killing.

### **(b) Aim of activity:**

Make clear what you are doing and why, and how to proceed during killing process.

### **(c) Treatment of live animals:**

Make clear how to prevent fear and harmful treatment of animals before and during killing procedures.

Make clear how to properly catch animals from the cage, how to transport live animals in a humane way etc.

Check physical conditions to enhance proper treatment. For example, lightning, safe instruments, aids etc.

### **(d) Killing method and essential parameters:**

Describe killing method and the parameters which are monitored to ensure proper killing.

### **(e) Instruction for killing equipment:**

Make clear instructions for operators. Place instructions so that they are easily available, if possible, close to the killing equipment.

### **(f) Check-ups**

Define the signs of good and easy death. How to monitor the dying process? How many animals are observed? How often checking of proper death should be done?

**(g) Activities in case of malfunction:**

Define what to do when malfunction of killing equipment occurs. Who is responsible for corrections and changes? Define alternate method of killing in case of malfunction.

**(h) Service of equipment:**

Make instructions for service of equipment. Make form of service available for staff and operators.

**(i) Guidance of staff:**

Clarify how to teach and train the staff and operators.

## **Appendix 2. Quick checklist for operator**

It is recommended to check at least the following items before pelting season:

(- Information to authorities prior to the killing according to national implementation practices)

- Plan for killing schedule
- Function of killing equipments
- Annual service operations
- Guidance of staff
- Safety instructions
- Reports of killings
- Evaluation to ensure death of animals
- Plan for malfunction and improvements

### Appendix 3: An example of check report for head-to-body electrocution

<b>Head-to-body electrocution of foxes</b>							
Name of the operator:			Date:				
Address:							
Killing starts:			Killing ends:				
Number of animals:			Species:				
Name of the person responsible:			Certificate of competence issued (date)		Notes:		
Other persons involved in euthanasia:							
Date/check time	The key parameters						
	Minimum current (mA)	Minimum voltage (V)	Maximum frequency (Hz)	Minimum exposure time (s)	Checks for death	Maximum stun-to-kill time (s)	Equipment calibrated
Optimisation of current							
Methods to prevent electric shocks before stunning							
Placement and contact surface of the electrodes							
Other notes and remarks:							
Maintenance and service of equipment:							
Signature of person responsible:							

## **Appendix 4: Animal welfare regulations and recommendations concerning fur animal industry in EU**

### **Regulations and directives related to killing:**

COUNCIL REGULATION (EC) [No 1099/2009](#) of 24 September 2009 on the protection of animals at the time of killing

### **Regulations and directives related to other procedures:**

COUNCIL DIRECTIVE [98/58/EC](#) of 20 July 1998 concerning the protection of animals kept for farming purposes

COUNCIL REGULATION (EC) [No 1/2005](#) of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97

### **Recommendations and action plans**

Council of Europe, 1999. Standing committee of the European convention for the protection of animals kept for farming purposes (T-AP). Recommendation concerning fur animals.

COMMISSION OF THE EUROPEAN COMMUNITIES. Communication from the commission to the European parliament and the council on a Community Action Plan on the Protection and Welfare of Animals 2006-2010. 23<sup>rd</sup> Jan 2006, Brussels, Belgium.

**In addition every EU country applies their own national regulations**

Appendix 5: Signs of good and improper stunning related to key parameters affecting the quality of death during electrocution.

Signs of good stunning and death	Signs of improper stunning and death
<ol style="list-style-type: none"> <li>1. Immediate loss of consciousness</li> <li>2. Loss of sensory and pain reflexes</li> <li>3. Loss of all muscle tension after electrocution <ul style="list-style-type: none"> <li>• minor movement may occur due to clonic muscle spasm</li> </ul> </li> <li>4. Cessation of voluntary movements <ul style="list-style-type: none"> <li>• no vocalisation, attempts to open eyes or stand up</li> </ul> </li> <li>5. Cessation of breathing <ul style="list-style-type: none"> <li>• no coughing or gasping of breath</li> </ul> </li> <li>6. No other signs of distress</li> <li>7. No heartbeat can be detected</li> </ol>	<ol style="list-style-type: none"> <li>1. Insufficient loss of consciousness</li> <li>2. Sensory and pain reflexes are present</li> <li>3. Muscle tension remains present <ul style="list-style-type: none"> <li>• severe seizures</li> </ul> </li> <li>4. Excessive movement <ul style="list-style-type: none"> <li>• disturbed vocalisation, attempts to open eyes or stand up</li> </ul> </li> <li>5. Recovery of breathing, <ul style="list-style-type: none"> <li>• deep gasping of breath or coughing</li> </ul> </li> <li>6. Some other signs of distress</li> <li>7. Heartbeat can be detected</li> </ol>