



# THE ENVIRONMENTAL AUTHORITY

P.O. Box HM 834  
Hamilton HM CX  
Bermuda

Telephone: (441) 236-4201

Email: [PollutionControl@gov.bm](mailto:PollutionControl@gov.bm)

## ENVIRONMENTAL AUTHORITY OPERATIONAL POLICY #9

### 9. EMERGENCY BACK-UP ELECTRICAL GENERATORS: EXHAUST EMISSIONS AND EXTERIOR SOUND GUIDELINES

#### Change Record Form

Rev.	Type of Change	Author	Date
1	First Issue (Exhaust Emissions only)	Dr G. Smith (Environmental Engineer)	March 2011
2	Second Issue (External Noise added)	Dr G. Smith (Environmental Engineer)	March 2015
3	Third Issue (sound and emissions updated)	Dr S. Lavis (Hydrogeologist)	July 2020

#### 1. PURPOSE

To manage the exhaust and sound emissions from *fixed or moveable* (see below) emergency back-up electrical generators (gensets) to the ambient air by: 1) requiring such equipment to be certified to the United States Environmental Protection Agency (US EPA) tier-based standards for exhaust emissions (or equivalent certification); and 2) for exterior sound levels from gensets to not adversely impact any surrounding residents or businesses.

#### 2. JUSTIFICATION

##### 2.1 Fixed and Moveable Gensets as Controlled Plant under the Clean Air Act 1991

The First Schedule of the Clean Air Act 1991 defines the term “controlled plant” as follows:

*“For the purposes of this Act, a controlled plant is a plant which is fixed or moveable (but not capable of being carried by hand)...”*

Subsection (f) of the First Schedule defines the following as a controlled plant:

*“(f) a facility which generates electricity or steam.”*

As fixed gensets are defined as being controlled plant under the Clean Air Act 1991, they will require a construction permit (CP) and an operating licence (OL) approved by the Environmental Authority (EA).

The Clean Air Act 1991 Section 4 ‘Construction of controlled plants without a permit forbidden’ states:

*(3) The expression “controlled plant” in this section does not include a controlled plant that is moveable.*

Moveable controlled plant (e.g. trailer-mounted gensets) therefore require an operating licence only.

##### 2.2 Issuance of Permits under the Clean Air Act 1991

The Clean Air Act 1991 Section 6 ‘Issue of [Construction] Permits’ states:

*“Issue of permits*

*(1) Subject to sections 16 and 17, the Authority may issue or refuse to issue a construction permit.*

- (2) *The Authority may, as a condition precedent to issuing a construction permit, require a change in the location of the proposed controlled plant or in that plant's plans or specifications.*
- (3) *The Authority may issue a construction permit—*
  - (a) *subject to such terms and conditions as it may think fit, whether or not relating to the concentrations, weights or rates of emission of air contaminants referred to in regulations; or*
  - (b) *subject to such requirements as it may think fit regarding the manner in which and the frequency with which levels of concentration, density or weight of air contaminants to be emitted by the proposed plant are to be recorded; or*
  - (c) *subject to such requirements as it may think fit as to the manner in which the controlled plant is to be tested or operated before normal operations commence.”*

### **2.3 Issuance of Licences Under the Clean Air Act 1991**

The Clean Air Act 1991 Section 7 ‘Operation of controlled plants without a licence forbidden’ states:

- “(1) A person shall not commence or continue the operation of a controlled plant unless there is an operating licence in force for the purpose.*
  - (2) *A person who operates a controlled plant—*
    - (a) *without there being in force an operating licence for the purpose; or*
    - (b) *in contravention of an operating licence in force in relation to that plant,*
- is guilty of an offence.”*

Section 8 of the Clean air Act 1991 ‘Applications for licences’ states:

- “8 (1) A person who proposes to operate a controlled plant shall, before beginning to operate the plant, make application to the Authority in the prescribed form for an operating licence in respect of the plant.*
- (2) *The Authority may require an applicant for an operating licence—*
  - (a) *where a construction permit was required, to show that the plant was constructed in accordance with the permit and that the requirements of the permit have been complied with; and*
  - (b) *to show that the person who will operate the plant will operate it in conformity with the operating licence if it is granted; and*
  - (c) *to supply any other details or information that the Authority may require.”*

### **2.4 Grant of Licences**

Section 9 of the Clean air Act 1991 ‘grant of Licences’ states:

- “9 (1) Subject to sections 16 and 17, the Authority may grant or refuse to grant an operating licence. The Authority may grant an operating licence—*
- (a) *subject to such terms and conditions as it may think fit, whether or not relating to the concentrations, weights or rates of emission of air contaminants referred to in regulations; or*
- (b) *subject to such requirements as it may think fit regarding the manner in which and the frequency with which levels of concentration, density or weight of air contaminants to be emitted by the plant are to be recorded; or*
- (c) *subject to other requirements as to the manner in which the plant is to be operated.”*

### **3 APPLYING FOR AN OPERATING LICENCE AND CONSTRUCTION PERMIT**

#### **3.1 Applications for New Gensets**

Application for a CP and/or an OL is undertaken by filling out an application form (available online: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>) and paying the fee/s. The form should be filled out in as much detail as possible and accompanied by the necessary supporting information, which will include as a minimum:

1. generator specifications – especially sound measurements for when the genset is under load (typically made at 7 m (23 ft) from the genset and given in units of dBA);
2. evidence of emissions certification (see below);
3. detailed, properly scaled site plans showing any walls or other obstructions that might affect sound levels offsite;
4. a detailed sound software model (see below); and
5. any other supporting information (such as details of any sound abatement measures).

#### **3.2 Applications to Replace a Genset**

The following statements apply when replacing an existing genset:

1. A new CP and OL application will be required if an older genset is being replaced by one with a greater power output, unless it can be clearly shown that the new genset is quieter;
2. A CP will not be necessary if an older genset is replaced by one with the same or smaller power output, unless the new genset is louder;
3. The EA will not “grandfather” in any new gensets if they have greater power output than the original genset;
4. All replacement gensets will be required to be fully compliant with this Policy; and
5. A decommissioning plan for the older genset will be required (as is stated in the licence conditions).

#### **3.3 Assessment of Licence Applications by DENR and the EA**

Once an application has been received by the Pollution Control Section of DENR (PCS-DENR), the information is assessed against the criteria of this Policy and supporting documents. PCS-DENR may contact the applicant or representative to request further information, undertake a site visit and/or further discuss matters such as sound abatement or sound modelling results.

Once assessed by PCS-DENR, the application is presented to the EA, who will then consider whether or not to approve it based on the information provided.

Once a genset is licensed, it will be considered a controlled plant until it is properly decommissioned and as such it will be required to be re-licensed annually.

#### **3.4 Operating Licence Conditions**

All operating licences are subject to a range of conditions, which must be adhered to. An example of the standard licence conditions can be provided on request by contacting [PollutionControl@gov.bm](mailto:PollutionControl@gov.bm). Conditions specific to a particular application may also be required by the EA from time-to-time.

#### **3.5 Fuel Tanks**

Any fuel storage tanks for diesel, gasoline or other liquids at ambient temperatures (other than day-tanks that are enclosed within the body of the Genset enclosure) shall be registered with PCS-DENR.

## 4. EXHAUST EMISSION REQUIREMENTS

The US EPA has developed stringent engine emission and economy requirements for virtually every vehicle and engine sold in the United States. The US EPA also certifies compliance with emissions regulations before an engine can enter into commerce within the US. To ensure Bermuda receives efficient, minimally-polluting gensets, this Policy requires that imported fixed gensets are certified as being compliant with the tier-based certification scheme operated by the US EPA (or equivalent) before a CP and/or an OL will be issued under the Clean Air Act 1991.

Equivalent European emission legislation is Directive 97/68/EC and Directive 2004/26/EC (Stage IIIA and IIIB Non-Road Diesel Engine Gensets). A genset imported from the European Union will require a “CE” mark to demonstrate compliance. DENR will review on a case-by case basis any other certification which may be deemed by the applicant as being of a similar standard to those listed above.

## 5. EXTERIOR SOUND REQUIREMENTS

In addition to exhaust emissions, the EA considers the potential adverse impact of sound on the residences and/or businesses surrounding fixed gensets and moveable gensets that are present at a location for periods of more than two months in any 12 month period. As per British Standard BS 4142-2014<sup>1</sup> [*numbers in superscript refer to documents listed in the References section at the end of this document*] the terms *noise* and *sound* in this Policy are not used interchangeably and are defined as:

*“Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.”*

### 5.1 Sound Levels

The “loudness” of sound to the human ear (or sound level) is generally measured in units of A-weighted decibels (dBA). The EA has set maximum sound level guidelines that should not be exceeded at *compliance points* (i.e. locations near to the exterior wall of a neighbouring house/building – see section 5.2 below) during specified hours (see Table 1). These guidelines are informed by those set by the World Health Organisation (WHO)<sup>2,3,4</sup> and the Government of California<sup>5</sup>.

Land Use Category	Time Period	Sound Level
Residential	Night (10pm to 7am)	45 dBA
	Day (7am to 10pm)	55 dBA
Office / Commercial	Any time	65 dBA
Industrial	Any time	70 dBA

**Table 1.** Environmental Authority sound level guideline values for Bermuda for different times of the day and land use categories. The guideline values are informed by those set by the WHO<sup>2,3,4</sup> and by the Government of California<sup>5</sup>.

Although the daytime and night-time residential guideline limits are different, in practice the night-time limit of 45 dBA should be considered as the design criteria for residential properties; gensets are typically used continuously over 24 hours during periods of interrupted mains electricity supply.

When considering approving CP and/or OL applications for gensets and other controlled plant, the EA requires that the sound level guidelines in Table 1 are not exceeded at the compliance point/s. The sound level guidelines are also incorporated into the list of conditions issued with each operating licence.

Demonstrating that the sound from a genset is compliant with this Policy can be achieved by:

1. For gensets that have not yet been installed: undertaking sound level software modelling, following the method set out in PCS-DENR's guidance document. Follow the link at: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>;
2. For gensets that are installed and require sound level measurement because of a complaint or because they were not previously licenced: undertaking sound level measurement following the method set out in PCS-DENR's guidance document. Follow the link at: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>.

For more information, PCS-DENR has prepared a pre-consultation advice document, which is available by following the link at: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>.

## **5.2 Compliance Points**

For sound level modelling, compliance points are assessed in the recommended MASdBmap sound software model at a distance of 1 m from the building in question (and at the appropriate height from the ground).

For sound measurement surveys, British Standard BS 4142-2014 states that a distance of 3.5 m (11.5 ft) away (i.e. towards the sound source) from the exterior wall of a neighbouring building will limit the effect of sound reflecting from that wall and back onto the sound recording instrument. It is, however, not always possible to measure 3.5 m away from a neighbour's wall e.g. if measurements need to be taken at a second story window. BS 4142-2014 provides a correction for measurements taken at 1 m from a sound-reflecting wall (i.e. subtract 3 dBA from a wall that is perpendicular to the sound travel path from the source, or 1 or 2 dBA from walls that are not perpendicular to the sound travel path). PCS-DENR will consider measurements taken at 1 m and corrected following BS4142-2014 or measurements taken at 3.5 m as being representative of compliance points, see the guidance document for more information by following the link at: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>.

## **5.3 Letters from Neighbours**

The EA will not accept letters from neighbours that state their agreement to be exposed to excessive noise from an applicant's genset as being the sole grounds on which to approve a non-compliant genset.

## **5.4 Complaints**

In the event of a complaint, either the PCS-DENR and/or an independent consultant/agent with appropriate professional experience will undertake a sound level measurement survey to determine whether a genset has breached the conditions of its operating license. Guidance on how to undertake a sound level measurement survey is set out in the guidance document, which can be found by following the link at: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>.

## **6. POLICY STATEMENTS**

1. The EA will approve CP and OL applications under the Clean Air Act 1991 for fixed and moveable back-up electrical generators that are certified by the US EPA, have a "CE" mark (if from the EU) or other equivalent certification.
2. The EA shall strive to ensure that the exterior sound generated by a fixed genset at a neighbour's residential dwelling is compliant with sound guidelines values shown in Table 1 before approving a CP or an OL.

3. Moveable generators present at a location for more than 2 months in any 12 month period shall be compliant with this Policy.
4. Sound level modelling shall be required to support the application of any new fixed genset.
5. Any replacement fixed genset will require a new CP and OL unless it is clearly quieter than the (licenced) genset it replaces (i.e. replacement gensets cannot be “grandfathered”).
6. Sound level measurement surveys shall be carried out according to the method set out in the guidance document, which can be found by following this link: <https://www.gov.bm/online-services/apply-construction-permit-and-operating-licence>.
7. In the event of a noise complaint from a genset, DENR and/or a suitably experience independent third party shall investigate the issue by conducting a sound level measurement survey. If the complaint is verified, the licence holder shall make efforts to bring the genset into compliance with this policy.
8. All operating licences, are subject to licence conditions. An example of the standard conditions can be provided on request by contacting [PollutionControl@gov.bm](mailto:PollutionControl@gov.bm)
9. Any fuel storage tanks for diesel, gasoline or other liquids at ambient temperatures (other than day-tanks that are enclosed within the body of the Genset enclosure) shall be registered with PCS-DENR.

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## References

- 1 British Standard 4142:2014. Methods for rating and assessing industrial and commercial sound Published by BSI Standards Limited 2014; ISBN 978 0 580 80051 1; ICS 17.140.20; 91.120.20
- 2 World Health Organization, Europe (2009). Night Noise Guidelines for Europe. ISBN 978 92 890 4173 7, pp184.
- 3 Berglund, Birgitta, Lindvall, Thomas, Schwela, Dietrich H and World Health Organization. Occupational and Environmental Health Team. (1999). Guidelines for community noise.
- 4 World Health Organization (WHO) Europe Environmental Noise Guidelines for the European Region (2018). ISBN 978 92 890 5356 3. Xviii.
- 5 California Riverside Municipal Code, Chapter 7.25 Nuisance exterior sound level limits, Section 7.25.010 Exterior sound level limits.
- 6 Department of Environment and Natural Resources (2019). Pre-consultation Guidance: Back-up Electrical Generators.