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1. PURPOSE AND SCOPE

1.1 INTENT

The University will take all actions necessary to maintain a safe work and study environment for faculty, staff, students, visitors and contractors.

In accordance with the requirements of Ontario Occupational Health and Safety Act and Ontario Regulation 851 for Industrial Establishments (as amended by O. Reg. 565/06) the University has developed and implemented a comprehensive Noise Control and Hearing Conservation Program (NC&HCP) to protect the University employees, students and contractors from hearing loss due to occupational noise exposure.

Low level or nuisance noise is not addressed as part of the Noise Control and Hearing Conservation Program. Nuisance noise may be irritating or annoying but it is not capable of inducing hearing loss. Due to subjective nature of this type of noise, concerns of nuisance noise will be addressed separately.

1.2 SCOPE

This program describes the requirements, responsibilities and process for implementing a Noise Control and Hearing Conservation Program at all University of Guelph sites. It applies to all University staff, faculty, students and contractors.

1.3 PROGRAM ELEMENTS

The major elements of the Hearing Conservation Program are:

1) documentation and communication of roles and responsibilities;

2) hazard assessments to identify all locations with hazardous noise levels, their assessments and control;

3) noise surveys, personal dosimetry;

4) worker education and training;

5) recordkeeping;

6) provision of a medical surveillance program, audiometric testing;

7) program audit and review

8) definitions and references
2. REGULATORY REQUIREMENTS

The University will meet or exceed the requirements of Ontario Occupational Health and Safety Act and its regulations. The University of Guelph has adopted criteria level noise exposure of 85 dBA as per section 139 of the Ontario Regulation 851 as amended by Ontario Regulation 565/06 under the Occupational Health and Safety Act of Ontario. Additionally, the requirements of the applicable Canadian Standards Association (CSA) Standards, including the CSA Standard Z94.2-02 (Selection, Use and Care of Hearing Protection Devices) and CSA Standard Z107.56-06 (Procedures for measurement of Occupational Noise Exposure) are incorporated into this program. The University has established an action level of 82 dBA Time-Weighted Average noise exposure for an 8 hour shift or 80 dBA for a 12 hour shift. All identified personal that are regularly exposed to occupational noise levels at or exceeding the action level are to be included in the audiometric testing program and will be required to participate in regular training.
3. BACKGROUND AND GLOSSARY

3.1 BACKGROUND

Sound waves can travel through air, water or solids. These pressure waves are transformed into mechanical, chemical and electrical energy respectively inside the human ear. The transfer from chemical to electrical energy is carried out by small hair-like sensors inside the ear. Loud sounds cause a large number of these hair-like sensor cells to move and many nerve impulses are transmitted to the brain.

A problem in any part of the ear may cause a hearing disorder or hearing loss. In general, hearing loss may be caused by a birth defect, an injury, or a disease.

Noise-induced hearing loss is one of the most common occupational illnesses. It usually develops over a long period of time and, except in rare cases, there is no pain. A progressive loss of communication and responsiveness to the environment occurs. The loss during early stages will be more pronounced in the higher frequency ranges. As hearing loss continues, it will start to affect frequencies of the normal speech (250 to 4000 Hz).

3.1.1 Types of Hearing Loss

There are two main types of hearing loss: conductive and sensorineural. A combination of these two types of losses can also occur.

1. Conductive Hearing Loss

Conditions of the outer or middle ear that interfere with the sound passing to the inner ear are known as conductive hearing loss. Some common causes of conductive hearing loss include excessive wax in the auditory canal, a rupture of eardrum and other physiological defects. Conductive hearing loss is typically not work related, however it may occur due to accidents involving an explosion, rapid pressure change or penetration of eardrum with a sharp object.

2. Sensorineural Hearing Loss

Chronic noise-induced hearing loss is a permanent condition that cannot be treated. Sensorineural Hearing loss is associated with damage to the inner ear. The damage is irreversible and involves the degeneration of neural elements of the auditory nerve. Initially, declining sensitivity to high-frequency sounds occurs, typically at frequencies above 2000 Hertz.

3.1.2 Causes of Hearing Loss

Hearing loss may be classified in terms of possible cause as follows:

1. Presbycusis: It’s the hearing loss caused by natural aging.

2. Noise-induced hearing loss:
a. Occupational hearing loss: Hearing loss caused by the work environment.
b. Sociacusis: Hearing loss due to the noises of everyday life.

3. Nosoacusis: Hearing losses attributable to all other causes including diseases, hereditary progressive deafness, ototoxic drugs and chemicals, barotraumas and trauma from head blows.

3.2 GLOSSARY

Action Level The noise level of 82 dBA Time-Weighted Average for an 8 hours shift or 80 dBA for a 12 hour shift above which control measures are required to be implemented for control of hazardous noise levels. At this level an employee is required to enrol in the Hearing Conservation Program and provided audiometric testing. Noise assessment is to be completed by Environmental Health and Safety and hearing protection and training is to be provided to the employee.

Audiometry A method of hearing assessment that tests an individual’s ability to hear sounds of different intensities and frequencies. Audiometry detects early, asymptomatic noise-induced hearing loss before the affected individual is even aware that it is happening.

Criterion Level A noise dosimetry term which has the same meaning as the regulatory exposure limit of 85 dBA as set out in Ontario Regulation 851 as amended by Ontario Regulation 565/06.

dBA Decibel. A-weighted (which is a standard frequency weighting to simulate the response to human ear). Measurement units for A-weighted sound pressure level.

Hazardous Noise Continuous noise at a sound pressure level equal to or greater than the Action Level of 82 dBA.

Noise Dosimeter An instrument worn by an individual that integrates the sound level exposure over a period of time.

Personal Daily Exposure Level The Level of a constant sound normalized over an 8 hour period that contains the same energy as the actual measurement period which is usually shorter than 8 hours. Leq, 8h equals 10 times the logarithm (base 10) of the time integral over any 24 hour period of a squared A-weighted sound pressure divided by 8.
4. RESPONSIBILITIES

This section outlines the unique responsibilities of a number of departments under the Noise Control and Hearing Conservation Program.

4.1 ENVIRONMENTAL HEALTH AND SAFETY

Environmental Health and Safety (EHS) has the primary responsibility for the administration, implementation and maintenance of the Noise Control and Hearing Conservation Program within the University.

4.1.1 Director, Environmental Health and Safety

The Director, Environmental Health and Safety has the following responsibilities:

1. To be responsible for the development, maintenance, quality and effectiveness of the Noise Control and Hearing Conservation Program, and to ensure that it meets all legislative requirements and industry standards.
2. To administer and maintain a centralized and comprehensive inventory of the employees and areas impacted by hazardous noise levels at the University.
3. To be responsible for ongoing noise surveys, dosimetry and application of noise control measures.
4. To audit the implementation of the Noise Control and Hearing Conservation program on an ongoing basis.
5. To review the Noise Control and Hearing Conservation Program on a regular basis, in consultation with the pertinent Joint Health and Safety Committee.
6. To be responsible for providing technical advice regarding identification, evaluation and control of hazardous noise levels to the University community.

4.1.2 Program Administrator

The Program Administrator has the following responsibilities:

1. To develop, implement and maintain the Noise Control and Hearing Conservation Program, and ensure that it meets the requirements of all applicable standards.
2. To ensure that the appropriate personnel are fully aware of their roles and responsibilities as defined in this program.
3. To provide technical advice and recommendations regarding control, hazard evaluation, and personal protective equipment related to noise hazards.

4. To provide assistance in the selection of appropriate hearing protection devices.

5. To ensure that all persons required to use hearing protection devices receive appropriate training prior to initial use of the hearing protection devices.

6. To monitor the use of hearing protection devices on a regular basis.

7. To develop and maintain a list of employees who work in areas with hazardous noise levels, and who have participated in the noise control and hearing conservation training, and the medical surveillance program (audiometric testing).

8. To provide standard operating procedures for noise surveys, dosimetry and selection of hearing protection devices.

9. To ensure that the areas with hazardous noise levels are easily identifiable with signage to building occupants and joint health and safety committees.

10. To establish requirements for identifying and labeling areas with hazardous noise levels in buildings.

11. To assist Physical Resources and other departments with the evaluation of any maintenance, renovation or construction activities that will or may result in the hazardous noise levels, as required.

12. To assist Physical Resources and other departments in evaluating the competence of noise control contractors and consultants, on the basis of proven service and performance, and documentation of adequate training and experience, as required.

4.2 OCCUPATIONAL HEALTH AND WELLNESS

Occupational Health Services has the primary responsibility for the administration, implementation and maintenance of the Hearing Medical Surveillance Program at the University of Guelph.

4.2.1 Manager, Occupational Health and Wellness

The Manager, Occupational Health and Wellness has the following responsibilities:

1. To be responsible for the development, implementation and maintenance of the Hearing Medical Surveillance Program.

2. To obtain audiometric testing and evaluation schedules relevant to employee’s exposure from the Environmental Health and Safety.

3. To conduct or arrange the periodic audiometric testing and evaluation as scheduled.
4. To provide employees with counseling and professional advice regarding audiometric testing.

5. To review audiometric data on a regular basis, alerting the affected employees of any hearing threshold shift (>10 dB over the baseline) or hearing loss incident (determined by the examining physician) and to advise Environmental Health and Safety to initiate investigation for hearing threshold shift incident.

6. To maintain all employee medical information in strict confidence within Occupational Health and Wellness. Copies of an employee's medical records and/or test results may be provided to his/her family physician on written consent.

7. To provide the results of medical examinations and tests, and recommendations regarding the employee's work limitations, to the employee.

8. To provide appropriate reports regarding an employee’s work limitations to the employee’s supervisor and to Environmental Health and Safety.

4.3 PHYSICAL RESOURCES (PR)

Departments within Physical Resources may install or contract installation of noise control equipment, mechanical equipment with elevated noise levels, perform maintenance on such equipment and have the primary responsibility for implementing engineering noise control measures.

4.3.1 Executive Director, Physical Resources

The Executive Director, Physical Resources has the following responsibilities:

1. To ensure that Physical Resources employees are familiar with and comply with their responsibilities in accordance with the University’s Noise Control and Hearing Conservation Program.

2. To ensure that the Noise Control and Hearing Conservation Program is fully implemented in Physical Resources.

3. To fully support the provision of Noise Control and Hearing Conservation and appropriate training of Physical Resources employees involved in activities that expose them to hazardous noise levels.

4.3.2 Director, Maintenance and Energy Services

The Director, through Managers, Supervisors, Lead Hands and other employees, has the following responsibilities:

1. To maintain an updated list of areas, equipment and processes that may produce hazardous noise levels in coordination with Environmental Health and Safety.

2. To ensure that all hazardous noise producing equipment and areas have the appropriate signage and supply of appropriate hearing protection devices near the entrance to such areas.
3. To ensure that employees who work in hazardous noise levels have been enrolled in various initiatives under the Noise Control and Hearing Conservation program including but not limited to training and audiometric testing.

4. To establish the type and quantity of hearing protection devices required for each of noise hazard in cooperation with Environmental Health and Safety and make them available to the employees who work in such areas along with the manufacturer’s instructions.

5. To restrict access to all Utility areas, which typically have hazardous noise levels.

6. To inform Environmental Health and Safety of changes in existing equipment/areas/noise controls associated with hazardous noise levels and addition of any equipment/noise control measure or use of hearing protection devices in areas that were previously not identified.

4.3.3 Director, Design, Engineering and Construction

The Director, through Managers, Supervisors, and other employees, has the following responsibilities:

1. To inform Environmental Health and Safety of new equipment that may produce hazardous noise levels during the design and installation.

2. To incorporate noise controls in the design process, where hazardous noise levels are expected, in consultation with Environmental Health and Safety.

3. To inform Environmental Health and Safety of changes in existing equipment/areas/noise controls associated with hazardous noise levels and addition of any equipment/noise control measure or use of hearing protection devices in areas that were previously not identified.

4.4 All Department Heads, Deans, Directors, Supervisors

The following responsibilities are associated with above mentioned roles:

1. To ensure that all employees in the department are familiar with and comply with their responsibilities in accordance with the University’s Noise Control and Hearing Conservation program.

2. To ensure that potentially overexposed personal attend Hearing Conservation training and regular refresher training.

3. To ensure that all potentially exposed workers are provided with appropriate noise controls, including hearing protection, and enrolment in audiometric testing.

4. To notify Environmental Health and Safety of noise concerns, identified potential noise hazards and workers who may be noise exposed.

5. To notify Environmental Health and Safety of process, material or equipment changes that may change the noise exposures.
6. To maintain an updated list and map of noise hazard areas, operations and exposed workers.

7. To ensure that recommended noise abatement actions are completed in a timely manner, where required.

8. To identify and post warning signage outside entrances to the noise hazard areas.

9. To ensure that the employees properly use and care for hearing protection devices.

10. To develop and implement the controls in coordination with Physical Resources and Environmental Health and Safety including Engineering Controls, Administrative Controls and Hearing Protection Devices.

11. To ensure that while purchasing new equipment prime consideration is given to selection of equipment that produces less noise.

12. To ensure that baseline testing is conducted for all employees who may be exposed to hazardous noise levels within first six months of employment or exposure.

4.5 UNIVERSITY EMPLOYEES, STUDENTS, MAINTENANCE CONTRACTORS

University Employees, Students, Maintenance Contractors who are or may be exposed to hazardous levels of noise have the following responsibilities:

1. To attend required training sessions on noise hazards, noise induced hearing loss and hearing conservation program.

2. To participate in audiometric testing, where required.

3. To wear hearing protection devices, where required.

4. To immediately report to a supervisor or other person in authority, any previously unidentified noise hazards and problems with hearing protection devices.

5. To maintain hearing protection devices in sanitary condition and proper working order.
5. NOISE HAZARD ASSESSMENT

5.1 NOISE SURVEYS

5.1.1 Where hazardous noise levels are suspected to be present, the appropriate Department Manager or Supervisor must request Environmental Health and Safety for an assessment that will properly identify and document the noise hazard using the form provided in Appendix A.

5.1.1.1 Where requested, noise surveys will be performed in accordance with CSA Standard Z107.56-06 to accomplish some or all of the following objectives:

- determine whether a hazardous noise (82 dBA or above) exists;
- characterize a noise source for the purpose of assisting in the design of effective engineering controls or other physical barriers;
- evaluate personal daily exposure levels and identify potentially exposed employees for inclusion in medical surveillance;
- determine the appropriate selection of hearing protection;
- determine the need for cautionary signage;
- provide personal exposure history for use in hearing loss compensation claims; and
- demonstrate regulatory compliance.

5.1.1.2 The surveys will be repeated when:

- any changes in production, process, equipment or controls occur which may change the noise levels;
- levels at or above the action level are expected, which will require notification to Environmental Health and Safety and may initiate the implementation of worker noise exposure assessments; and
- periodic reassessment of identified noise hazard areas.

5.2 PERSONAL NOISE DOSIMETRY

Based on the noise survey data, employees or occupations whose exposure likely will exceed the action level of 82 dBA will be identified. Representative noise exposure monitoring will be carried out by Environmental Health and Safety for the identified employees or occupations. Monitoring will be repeated when a change in the process, equipment, production occurs or at regular intervals for audit purposes. Workers exposed at or above the action level will be notified of the results of the monitoring and included in the Audiometric testing Program. Copies of the results of noise exposure assessment will be provided and are available upon request by an affected employee.
5.3 **OTOTOXIC DRUGS AND CHEMICALS**

These are drugs and chemicals that may increase the vulnerability of inner ear to noise related health effects resulting in an increase in temporary or permanent loss of hearing or aggravation of an existing sensorineural hearing loss.

Examples of ototoxic drugs include kanamycin, gentamicin, cisplatin and aspirin. Chemicals known to be ototoxic include toluene, xylene, paint solvents and carbon disulfate, carbon monoxide gas, heavy metals such as lead, arsenic, mercury, manganese etc.

It is the responsibility of supervisors and employees to identify the presence of these chemical and drugs in their workplace or intake of these drugs during or prior to working in areas with hazardous noise levels. Supervisors are to ensure that their personnel are trained and competent in the use and control of such drugs and chemicals.
6. NOISE CONTROL

As per the requirements under the Occupational Health and Safety Act of Ontario, the University will follow the hierarchy of control as follow: Engineering Controls, Administrative Controls and Personal Protective Equipment.

6.1 ENGINEERING CONTROLS

The most effective approach to noise reduction in the workplace is to reduce the noise at source using engineering controls. Engineering controls can help eliminate the need for hearing protection devices, audiometric testing and training of employees. In some instances the reduction below regulatory limits may not be achieved, however this reduction may increase the effectiveness of hearing protection devices. Engineering control can be in the form of Reduction at Source, Enclosure of the Noise Source, Enclosure of Employees, Acoustical Treatment of the Room and Increasing the Distance from Source or a combination of these. Some examples include: installing a muffler, using sound absorbing materials and performing regular maintenance including lubrication and tuning.

It is important to consider the noise levels generated by new equipment at the time of purchase. Prior to purchase of equipment, the noise specifications must be reviewed for long term implications of equipment that produces sound at or above 85 dBA.

6.2 ADMINISTRATIVE CONTROLS

Administrative controls include changes in work procedures and provision of work-rest cycles to reduce the overall exposure of the employees.

Warning signs are required for areas where noise levels exceed 85 dBA as per the regulatory requirements. These signs must clearly indicate that the use of hearing protection is mandatory for entry.
7. PERSONAL PROTECTIVE EQUIPMENT (HEARING PROTECTION DEVICES)

If engineering and/or administrative controls are not able to eliminate the noise hazard, hearing protection devices can be used to reduce the noise exposure to acceptable levels. Hearing protection devices must be used where sound levels regularly exceed 85 dBA or where an employee’s exposure may exceed limits set in Appendix I. The hearing protection devices must meet the requirements of CSA standard Z94.2-02, Hearing Protection Devices- Performance, Selection, Care and Use.

For areas where noise exposure is between 80-85 dBA, hearing protection is optional but should be available for use. All hearing protection devices have to be approved by the Environmental Health and Safety or the program administrator. Two major types of hearing protection devices are ear muffs and ear plugs, their selection, appropriate use and limitations are discussed in Appendix B.
8. EDUCATION AND TRAINING

All employees who are required to wear hearing protection devices and/or are exposed to noise at or above an 8-hour TWA of 82 dBA must attend the noise training offered by the Environmental Health and Safety.

Training will cover the following topics:

- The hazards of noise (at work and at home), and effects on hearing;
- Discussion of pertinent noise surveys and or exposure assessments;
- Noise control strategies;
- How to select appropriate hearing protection devices;
- The advantages, disadvantages and attenuation of various types of hearing protection devices;
- Instruction of proper use and care of hearing protection devices; and
- The purpose of audiometric testing.
9. AUDIOMETRIC TESTING

The University of Guelph will provide audiometric testing to all personnel who are identified as being regularly exposed to noise levels at or above the action level of 82 dBA TWA for an 8 hour shift. All employees exposed to elevated noise levels will be enrolled in the audiometric testing program and will be provided the following:

- Baseline audiometric testing within first six (6) months after an employee is assigned/hired to work in an environment that has hazardous noise levels above the action level.

- Within first 12 month period following the baseline test, and

- Periodic evaluation (at 1 or 2 year intervals) for employees whose personal exposure levels exceed the regulatory limit of 85 dBA over an 8 hour work shift.

- Periodic evaluation (at 5 year intervals) for employees who normally work in areas where hazardous noise above action level of 82 dBA exists.

- Evaluation at the termination of employment of those employees who have worked in areas with hazardous noise levels.
10. RECORD KEEPING

A copy of Noise Control and Hearing Conservation Program and occupational noise assessments must be available for review at the request of affected workers or the regulatory officers.

10.1 NOISE EXPOSURE ASSESSMENTS

Noise exposure assessment records, including noise surveys and personal dosimetry, must be retained by EH&S and the subject Department for as long as the University of Guelph operates; the records must include:

- The dates of assessment;
- The employees, occupations, equipment or area evaluated;
- The description of work location evaluated; and
- The type of measuring instrument used

10.2 AUDIOMETRIC TEST RECORDS

Audiometric test records must be retained by the University, for employees enrolled in the Noise Control and Hearing Conservation Program for a period not less than 10 years; the records must include:

- The name and occupation of the employee;
- The date of the test;
- The name of the examiner;
- The employee's most recent audiogram; and
- The date of the last calibration of the audiometer and the measurement of the background sound pressure levels in the audiometric test rooms.

Occupational Health Services will retain the worker audiometric test results, documentation of referrals, follow up and any reports to supervisors and EH&S.
11. PROGRAM AUDIT AND REVIEW

11.1 PROGRAM AUDIT

Throughout the year, Environmental Health and Safety will audit various components of the Noise Control and Hearing Conservation Program on an on-going basis. This will include an audit of:

1) the status of the noise surveys and assessments;
2) the management of hazardous noise level areas by supervisors;
3) the status of worker training;
4) worker compliance with Noise Control and Hearing Conservation program

11.2 PROGRAM REVIEW

On a regular basis, the University will review and may amend the program in consultation with the Joint Health and Safety Committee(s) or Health and Safety Representative.
## Personal Noise Dosimetry Record

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<th>Site Details</th>
<th>Employee/Group Job Details</th>
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### Calibration Record

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<tr>
<td>Post-Survey</td>
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### Test Results

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<td>Slow Max :</td>
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### Assessment

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### Describe the process

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<th>Slow Max Level&gt; 82 dBA</th>
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<th>Require audiometric testing?</th>
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### Signatures

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<th>Date:</th>
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<table>
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<th>Signature:</th>
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Hearing Protection Devices

Where noise levels below 82 dBA (action level) cannot be achieved using Engineering Controls, University of Guelph will provide appropriate hearing protection devices to employees in accordance with following requirements:

1. Hearing Protections Devices (HPDs) used by the University employees shall meet the requirements of CSA standard Z94.2-02 “Hearing Protection Devices – Performance, Selection, Care and Use”.

2. Appropriately rated or classified hearing protection devices are to be used based on the EHS approval and the noise levels present in respective areas:

   2.0 As a general guideline, in order to access designated “Noise Hazard” areas the employees must wear Grade 4 or Class A hearing protection for noise hazards with Leq between 85 dBA and 105 dBA.

   2.1 Dual protection is to be used in situations where noise hazard above 105 dBA are present. Use Class A earplugs with Class A earmuffs. Administrative controls to limit employee access to these areas are to be implemented in coordination with EHS.

3. A change in equipment, acoustics of the area, relocation of equipment and other factors can impact the noise levels. The effectiveness of HPDs is to be re-evaluated by supervisors and EHS following these types of changes.

4. Identification of noise sources shall be completed by supervisors prior to work assignments and where such unknown sources are present EHS is to be contacted for evaluation.

5. The areas with noise hazard related signage shall never be accessed without HPDs.

Contact EHS for further information on recommended HPDs and other noise hazard control strategies.
Noise Hazard Warning Signs

Caution Sign for Noise Hazard Areas

Caution
HEARING PROTECTION MUST
BE WORN IN THIS AREA

Hearing Protection required when equipment in Operation:

Caution
HEARING PROTECTION MUST
BE WORN WHEN MACHINE IS OPERATING
## Noise Exposure and Work Shift

<table>
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<th>Duration of Exposure Per Day</th>
<th>Maximum Permissible Exposure Durations for Noise without Hearing Protection (with 3dB exchange rate)</th>
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