

*The Direction of the Ecole polytechnique fédérale de Lausanne hereby adopts the following:*

## Preamble

A liquid He system (LHe-S) has been successfully operated since January 2006. The general procedures for the operation of the LHe-S are described at the web-link: [https://crppwww.epfl.ch/~alberti/helium\\_liquide1/](https://crppwww.epfl.ch/~alberti/helium_liquide1/). For a few years the number of users has significantly increased together with also a degradation of the He-recovery rate as well as the quality of the recovered gas. Therefore more formal and precise directives need to be written by the EPFL and are applicable to every user of the LHe-S.

## Article 1 Competence

The Swiss Plasma Center (hereafter SPC) is in charge of the operation and maintenance of the LHe-S for the EPFL and for distribution to users within EPFL. SPC has also the authority to edict the directives for the use of this service.

## Article 2 Definitions

### 1. User

A User is defined as a laboratory or center of EPFL using liquid He and connected to the LHe-S recovery system and its service.

### 2. Cryogenic Equipment

- Two different types of Cryogenic Equipment are considered at the level of the LHe-S:
  - Equipment with the liquid helium bath operated above atmospheric pressure,
  - Equipment with the liquid helium bath operated below atmospheric pressure;
- The second type is more delicate in terms of purity of the recovered gas since important amount of impurities (essentially air) can be potentially introduced in the recovery system.

### 3. Recovery rate

- The recovery ratio  $R_{He}$  ( $R_{He} = \text{Mass of gaseous pure He recovered} / \text{Mass of liquid He delivered to the users}$ ) shall be larger than 80%.
- Based on the gas-counters installed in each laboratory connected to the recovery system, the recovery rate will be calculated for each laboratory every 6 months.

### 4. Impurities

- Any operation on the cryogenic equipment shall be such to minimize the introduction of impurities in the He-gas recovery system. The recovered gas helium purity shall always remain above 95% and lower levels are tolerable for time periods shorter than 20 minutes.
- Special care should be paid to the system in which the He-bath is pumped and brought below atmospheric pressure. Low purity He limits the liquefaction capacity on the one hand, but also leads to a low recovery ratio  $R_{He}$  and therefore a high operation cost charged to all users.

3. In some sectors of the gaseous recovery network (a sector may regroup many Users), a dedicated measurement equipment allows to measure the global purity of gaseous He return to the system.
5. **Empty Dewar and Warm Dewar**  
Any Empty Dewar shall be returned cold, i.e. with a few liters of liquid helium left (up to 5 liters of liquid Helium). A dewar not fulfilling this condition is called Warm Dewar.
6. **He price**
  1. The Helium price is calculated on a yearly basis and does take into account the following costs:
    - a. The salary of 2.1 posts for exploitation and maintenance of the LHe-S;
    - b. Procurement of He for compensation of the He losses;
    - c. Equipment maintenance;
    - d. Contingency. A contingency fund needs to be available and maintained for:
      - 6 months of salary for the above 2.1 post;
      - 100 kCHF for unforeseen events associated to the maintenance.
  2. Taking into account the points above, the He price will be calculated and communicated to the Users at the beginning of the calendar year. This He-price per litre shall be applied for laboratories reaching a recovery rate RHe higher than 80%.

### Article 3 Duty of the User

<sup>1</sup> Every User shall define a group e-mail address including all the individuals in its laboratory who are connected to the LHe-S. It is the responsibility of the Users to keep this list up-to-date in order to ensure that all the members will be properly informed on any matters related to the LHe-S. All information via e-mail from the LHe-S email address ([helium.liquide@epfl.ch](mailto:helium.liquide@epfl.ch)) will be sent to the group addresses.

<sup>2</sup> Any User planning to operate a new Cryogenic Equipment shall inform in writing via e-mail the personnel operating the LHe-S ([helium.liquide@epfl.ch](mailto:helium.liquide@epfl.ch)). Before starting the operation of a new cryogenic equipment connected to the LHe-S, the apparatus shall be certified by personnel of the LHe-S that it is compliant with the defined practices, which are communicated to the User.

<sup>3</sup> The SPC will have the authority not to authorize the connection of or to disconnect the apparatus to the recovery system if it is not compliant with the defined practices. In the latter case, the SPC shall not supply liquid Helium to the corresponding laboratory until it shows that it complies with the defined practices.

<sup>4</sup> The Users shall always verify that the helium purity in their sector is consistent with the maximum impurity levels defined above. A real time measurement of the impurity levels is available on the web-link [http://helium.epfl.ch/Quality\\_helium\\_recovery.html](http://helium.epfl.ch/Quality_helium_recovery.html).

<sup>5</sup> Users shall inform in written form via e-mail to [helium.liquide@epfl.ch](mailto:helium.liquide@epfl.ch) any observation of possible malfunctioning of the recovery system.

<sup>6</sup> The user is responsible to return the Empty Dewar according to the above definition.

<sup>7</sup> Once the dewar is empty, as defined above, and is stored in the delivery/recovery places an e-mail shall be sent to [helium.liquide@epfl.ch](mailto:helium.liquide@epfl.ch) mentioning that an empty dewar has been returned.

<sup>8</sup> Any Empty Dewars shall be returned before Friday 12am with the accompanying e-mail also sent before Friday 12am.

<sup>9</sup> In case a dewar is returned in warm state (i.e, not fulfilling the above definition of 'Empty Dewar') an additional fee of CHF 300 will be charged per Warm Dewar.

<sup>10</sup> The User accepts that a higher cost of He will be charged if the RHe is lower than 80%. The higher price will be equivalent to that of the public liquid helium market and will be applied to the difference between the 80% of the delivered He and the actual recovered quantity.

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**Article 4      Case of *Force Majeure***

In exceptional cases of *Force Majeure* for which the delivery of He from the LHe-S needs to be partially or totally suspended for an extended period of time the following rules are applied:

1. All users will be informed in written form from LHe-S on the reason of “Force Majeure” and the expected time period.
2. Essentially two main cases of *Force Majeure* have to be considered:
  - a. Non availability of He on the public market for an extended period of time.
  - b. Failure of an essential component of the LHe-S, which requires an extended time period for repair.
  - c. In case of pt. 2.a. above if the He inventory of the LHe-S is below a threshold of 30% of the total inventory an emergency plan will be enforced. This emergency plan is endorsed by the Direction of the FSB and is based on recommendations of the Helium Advisory Group<sup>1</sup>. This emergency plan will take into account priorities based on the typology of cryogenic equipment operated.
  - d. In case of pt 2.b. above an emergency plan will also be enforced. All users will be requested to procure the LHe on the public market without passing via the LHe-S. No refund for the value of the recovered gas during this time period will be considered.

**Article 5      Coming into force**

The present directive comes into force on 21 November 2013, version 1.1, status as at 1 January 2017.

On behalf of the EPFL Direction:

Philippe Gillet  
Acting President

Susan Killias  
General Counsel

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<sup>1</sup> The Helium Advisory Group is made up of representatives of the EPFL Institutes and Centers taking advantage of the LHe-S Service.