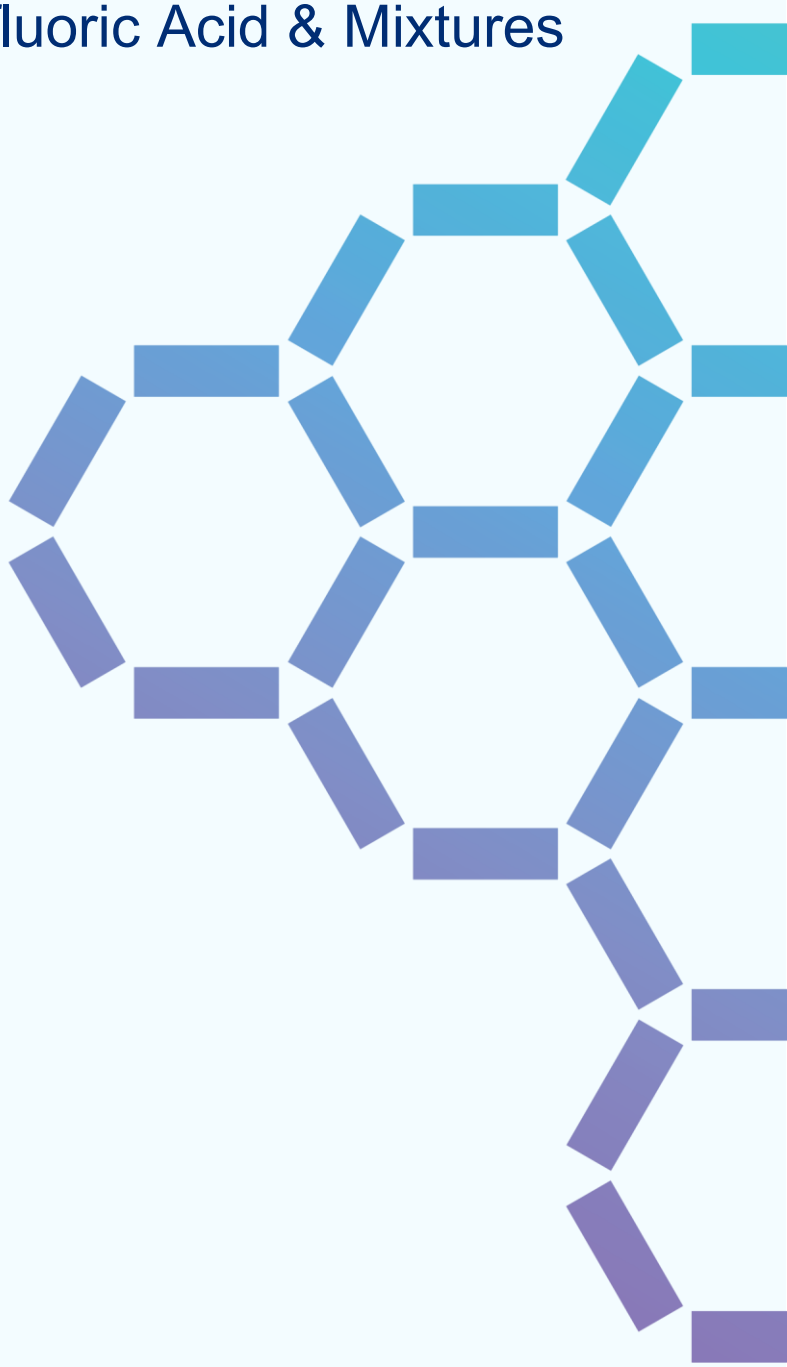
Hydrofluoric Acid Guidance – Section E
Sampling Hydrofluoric Acid & Mixtures



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Chemical Industries Association

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Introduction

The Hydrofluoric Acid Sector Network of the Chemical Industries Association (CIA) has developed this Guidance. It is intended to identify best practice to be used when taking a sample of anhydrous HF or aqueous HF. The Guidance is based upon many years of practical experience amongst member companies of the CIA HF Sector Network.

This Guidance reflects the 'best current practice' (at the time of publication). It is recommended for use in conjunction with information from the supplier(s) and users of HF to form the basis of discussion aimed at determining the standards required for sampling HF.

This document provides Guidance on best practice for sampling HF only.

Note: There are many significant differences in HF Acid manufacture and use processes, in terms of acid strength, process pressures and temperatures, site layout, and plant operability. As such there may be variations in the applicability of aspects of this Guidance. Where there are such variations, they should be locally risk assessed, and each site should adapt, develop and approve its own procedures as necessary, based on the Guidance.

The Guidance is a recommendation and not a mandatory standard to which all users of HF must adhere. It should not be used as a substitute for any applicable specific legislative requirement. Whilst all reasonable efforts have been made to ensure the accuracy of the contents and correspondence to legislative requirements at the time of publication, readers must refer to these themselves to ensure their compliance with current legal duties.

Additional information that supports this sampling Guidance may be found in the following CIA HF Sector Network Guidance Sections:

- **Section A – Training Requirements for HF Handling Facilities**
- **Section B – Personal Protective Equipment for Use at HF Handling Facilities.**
- **Section I – Emergency First Aid Treatment for HF Burns and Injury.**
- **Section J – HF Handling in Laboratories.**

Acronyms

AHF	Anhydrous Hydrogen Fluoride
CCTV	Closed Circuit Television
HF	Hydrogen Fluoride, Hydrofluoric Acid
PPE	Personal Protective Equipment

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E1. General

1. All personnel involved in the sampling of HF material must be fully trained and competent to carry out the task.
2. Both sample taking frequency, and the volume of HF sample taken, should be minimised. If an online analyser is installed in the process equipment, a frequency of once per week should be targeted; if there is no analyser, three times per week may be necessary.
3. Sampling operations should, whenever possible, be performed when HF plant personnel numbers are at a minimum.
4. HF sample connections should be located at grade or on an unobstructed structure that allows safe and easy access and egress for persons taking the sample.
5. HF sample points should be permanent installations with sample connections positively isolated by closing and capping off valves and with leak containment devices available when not taking a sample. The sample system should be of a closed loop design, including a flush / purge capability. Ideally, this should be able to be vented to the acid flare where such equipment is present, such as refinery alkylation units.
6. The sample bomb or container should be externally neutralised as soon as reasonably practicable and before the vessel/s are delivered to the laboratory for analysis. The sample should be transported in a secondary container, clearly labelled to show that it is in HF service. Good practice is to paint the secondary container in HF detecting paint. The sample should be kept in a secure, restricted and well-ventilated area until such time as the material is tested. Each site should have a written and controlled procedure to ensure the security of the sample bomb or container is maintained.
7. All personnel undertaking either the sampling or analysis must wear appropriate PPE. This could include, but is not limited to, air-fed hoods, face shields, upper body protection, gauntlets and/or goggles.

E2. Layout

1. The sampling area will be within the boundaries of the HF acid facility.
2. The sample point should be clearly labelled as “HF sample point”. Supply, return and vent pipework should be clearly identified. Any pipework allowing routing to drain or atmosphere should be of double block design.
3. The sample area should be well lit.
4. There should be clear access to the area for emergency responders.
5. The area around the sample point should be constructed of material of an adequate chemical resistance to enable safe collection of any spillage and to prevent ground contamination.
6. During the sampling procedure, the local area must be restricted using a physical barrier, including signage to prevent unauthorised access. If the physical barrier is not permanent, then any temporary barrier should be established and removed by persons who are not wearing contaminated PPE.

E3. Equipment

1. There should be a safety shower available near to the sample point with an alarm relayed to a manned area. Immediately prior to taking a sample, the safety shower and alarm should be tested to prove they work.
2. A First Aid kit should be provided adjacent to the safety shower. This kit must contain primary First Aid treatments for any potential HF exposure.
3. The appropriate level of PPE must be worn when sampling, considering the pressures, temperatures and concentrations of the sample stream.
4. A method of communication between the sampler and the Control Room should be established. If line of sight cannot be maintained, then a back-up Operator should monitor the procedure. If available, CCTV should be used.
5. The sample bomb or sample container should be overhauled, inspected and tested before each new sample is taken. Written procedures should be established for HF sample bombs or containers that will cover dimensions and materials of construction as well as their neutralisation, cleaning and storage.
6. The bomb or container should be transported between the sample site and place of analysis in a carrier which provides secondary

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containment in case the sample container develops a leak during transportation. If the sample is being transported in a vehicle, then it must not be transported in the cabin area.

7. The sample carrier should be clearly labelled as to the contents of the bomb or container.
8. Only specifically designed and approved sample bombs or containers designated for HF sampling are to be used in this service. They shall be chemically resistant to and compatible with the material being sampled and be mechanically robust, i.e. of rigid construction, which is watertight, shatterproof if accidentally dropped, and will not degrade over the time it is being used for sampling.
9. Each sample bomb or container should be uniquely identified. Unless containers are 'single use', inspection of the sample bomb or container by a thickness determination method should take place on an established frequency and records kept of any thinning detected. For bulk produced plastic sample containers where unique identification is not possible then they should be considered as single use only.

E4. Operation

Sampling operations shall be carried out following a prescribed and controlled procedure, which will as a minimum cover the following:

1. Ensuring that safety equipment is available, operational and in good condition.
2. Appropriate PPE, conforming to a list of required PPE, is to be worn when taking samples.
3. A step-by-step guide, listing operation of removing and replacing valve leak containment and valve operation sequence for obtaining a sample. The step-by-step guide should ideally be engraved on a laminated instruction board and fixed next to the sample point so that persons wearing high risk PPE can work through the procedure without the need to refer to a paper copy of the procedure.
4. A sampling pipe work integrity test should be done before each sample.
5. Following a written and approved procedure, the sample should be delivered to an approved sample testing area and securely stored whilst waiting to be tested.
6. Control of the area during sample taking should be specified.
7. The disposal arrangements of the sample material left after sampling, and any equipment used during sampling, should be specified in the procedure.

E5. Emergency Procedures

1. A written emergency plan and alarm system should be in place and all relevant personnel trained and assessed in its provisions.
2. Emergency protective clothing suitable for leak isolation must be accessible.
3. Emergency First Aid information should be specified and supplies provided.
4. Qualified First Aiders must be trained in First Aid procedures for HF burns (see HF Sector Network Guidance Section I).
5. Periodic training and emergency response exercises should be conducted to ensure sampling personnel and standby personnel used as first line responders are familiar with the emergency response procedure.
6. The site should communicate and discuss preparedness with the local hospital at least once a year. This should include the latest treatment advice for HF exposure.

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E6. Training

Staff should be trained in, and a record kept of, the following topics:

1. Sampling system operation including competency assurance assessments.
2. Operational hazards and risks.
3. Operating procedures, including transportation and security of sample.
4. Emergency procedures.
5. Exposure control methods.
6. Waste management procedure.

E7. Auditing

To ensure that relevant procedures and standards are maintained, regular auditing of HF sampling procedures and methods is imperative. Periodic auditing will confirm that systems are working correctly and are being followed or highlight any improvement opportunities.

1. Auditing should be considered at a number of different levels, e.g. frequent audits from within the work group and less frequent, external auditing by non-facility personnel.
2. All auditors must be suitably trained and competent for access to HF areas and facilities.
3. All audits and actions generated should be fully documented with individual actions and responsibilities clearly identified and followed up.

E8. Examples of Sample Containers

.Figure E8.1 Example of Monel Sample Container Used in Refineries

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Figure E8.2 Example of Sample Containers Used in Non-Refinery Processes – Needle & Septum Design

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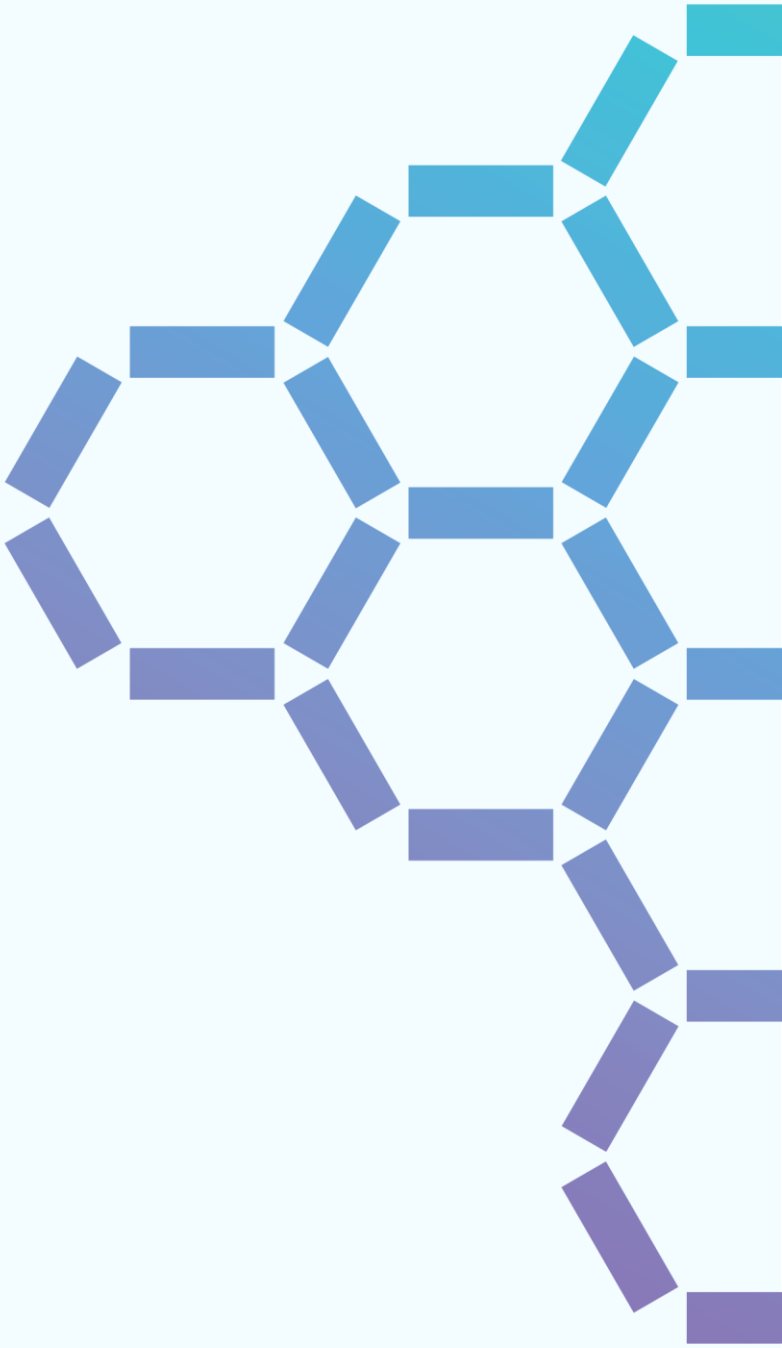

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