



Technical Guideline

Number

6.11e

B-MT

Cleaning and Cleanliness of Cryostats and Related Components

Status

2011-05-31

Contents

1.	Scope.....	1
2.	Codes and Standards	1
3.	Definitions	1
4.	Surrounding conditions	2
5.	Protective measures	2
6.	Requirements on processes, materials and detergents.....	2
7.	Requirements on Cleaning Results.....	3
8.	Documentation	3
9.	References.....	3

1. Scope

- 1) This document defines requirements on cleaning results as well as on cleaning processes applied to cryostat vacuum vessels and insulation vacuum related components within cryostats in applications like
 - magnet cryostats
 - cryogenic supply systems
 - cryogenic transport systems
 - cryogenic current lead boxes
 - auxiliary cryogenic systems within FAIR accelerators.
- 2) This document is NOT related to
 - any ultra high vacuum- or beam vacuum chamber applications
 - any component of a cold mass being operated within a cryostat
 - support feet and support frames,
 - specific vacuum components like pumps, gauges, valves, gaskets etc..
- 3) This document does NOT represent a replacement for any relevant instructions for use of any special detergents applied for cleaning purposes.
- 4) This document does NOT represent a replacement for any relevant safety instructions in terms of safety at work.
- 5) This document is NOT related to any other purpose as aforementioned.

2. Codes and Standards

- 1) The European directive 98/24/EC defines the relevant issues of protection of the health and safety of workers from the risks related to chemical agents at work.

3. Definitions

- 1) A *cryostat* in terms of this document is a technical system enclosing another technical system being operated at temperatures far below room temperature (e.g. 4.5K).



Technical Guideline

Number

6.11e

B-MT

Cleaning and Cleanliness of Cryostats and Related Components

Status

2011-05-31

- 2) A *cryostat insulation vacuum shell* in terms of this document is the outermost cryostat shell which is keeping the insulation vacuum of a cryostat.
- 3) A *cryostat related component* in terms of this document is a component being permanently joined to the outer structure of a cryostat facing the insulation vacuum, respectively being located inside a cryostat insulation vacuum shell.
- 4) A *cryostat flange* in terms of this document is any flange, being permanently joined to a cryostat insulation vacuum shell.

4. Surrounding conditions

- 1) Any cleaning process must be performed in a clean, low dust and dry surrounding.
- 2) The general light conditions at the working place must be adequate for visual inspections.

5. Protective measures

- 1) Any cleaning process being applied must not create a risk for workers in terms of [1] and in terms of safety at work. All relevant and necessary safety instructions for any cleaning process must be adhered.
- 2) To avoid elaborate cleaning processes, contamination of components and surfaces must be carefully avoided already during production whenever reasonable by applying adequate protective measures against contamination.
- 3) Any reference object on any cryostat component must be carefully protected from being contaminated by applying adequate protection measures.
- 4) To avoid contamination during handling in production, the use of dry, clean and lint-free gloves is recommended when ever possible.
- 5) Once cleaned, all vacuum related surfaces must be handled with lint- and dust-free gloves only.
- 6) Once cleaned, anew contamination must be strictly avoided by applying adequate packaging and protection caps.

6. Requirements on processes, materials and detergents

- 1) Chemicals being banned for reasons of safety at work, as defined by [1], must not be applied in any cleaning processes.
- 2) Prior to application of any cleaning process, it must be assured that the process is not damaging, corroding or influencing a component concerning its functionality. In case of doubt, the particular cleaning process must not be applied and another solution, providing sufficient cleaning results, must be developed.
- 3) Any cleaning process being applied must not produce anew residuals as a result of its application, e.g. lint from wiping cloth, remaining sand from sand blasting, dried residuals from ultrasonic cleaning, residuals from adhesive tapes used as protective masking etc..
- 4) Cleaning processes being planned for application must be agreed with the contracting entity in writing in due time prior to the planned date of application.

Prepared by:	J. P. Meier	Doc. Name:	f-tg-k-6.11e_cleaning_cryostat_vacuum_vessels_components_20110531.doc
Date:	2011-02-25	Version:	1.0

7. Requirements on Cleaning Results

- 1) Organic or inorganic residuals from any process applied to the outer surface of a cryostat vacuum shell; e.g. oxide films from welding, blurs from varnishing etc.; must be removed by applying adequate cleaning processes.
- 2) Residuals from any protective measure, e.g. masking with adhesive tape must be removed completely.
- 3) Organic or inorganic residuals from any process applied to vacuum related surfaces of a cryostat vacuum shell or cryostat related components; e.g. oxide films from welding, coolant from machining processes etc.; must be removed by applying adequate cleaning processes.
- 4) Sealing surfaces, gasket grooves and cryostat flange surfaces must be cleaned from organic and inorganic residuals by applying adequate processes.
- 5) All vacuum related surfaces of a cryostat must be dry after a cleaning process being completed.
- 6) In case of unavoidable contaminations; e.g. sand like glass beads within gaps, adhesive residuals from application of protective masking etc.; those must be removed by adequate measures.
- 7) After a cleaning process being finished, the cleaning result must be carefully checked and approved within the quality assurance documentation.

8. Documentation

- 1) Each cleaning process applied, must be documented within the quality assurance documentation of the production process with at least the following information:
 - Process type (e.g. wiping, glass bead blasting, ultrasonic cleaning etc.)
 - Important process parameters if applicable
 - Applied chemicals and materials
 - exceptional occurrences
 - Name of responsible worker
 - cleaning result
- 2) The correct application and checking of the result of a cleaning process must be signed by the responsible worker.
- 3) In case special detergents were used in any cleaning process, those must be listed with brand name and lot number within the quality assurance documentation.

9. References

- [1] European directive 98/24/EC, European parliament and the council of the European Union, <http://eur-lex.europa.eu>, 1998