1. Application area

These guidelines apply to all cold traps (e.g. Meissner traps, baffles) and the refrigerant pipes, i.e. the connection pipes to the cryo-generator. The scope of application covers the design, manufacturing, testing as well as the specifications in the drawings.

2. Purpose

This BLOA standard describes the activities, materials and preconditions required for a technically correct manufacturing and testing of cold traps and refrigerant pipes that are conform to the Pressure Equipment Directive (97/23/EC).

3. Basics

This standard describes the design, manufacturing and testing for **category II**. Criteria that indicate that a cold trap has to be designed, built and tested according to **category II** are listed in the standard LHH-N 090.218.

4. Layout and design

The ***refrigerant pipes*** are designed and manufactured according to sound engineering practice.
Pressure tests and CE mark are not required.

The design documents for the ***cold traps*** must be archived. Inspection documents 3.1B according to DIN EN 10204 for all materials used, such as pipes, fittings and brazing material, must be requested from supplier and must be archived.

5. Manufacturing

Qualification of Personnel: Persons in charge of brazing joints of cold traps or refrigerant pipes have to complete a test in the context of a procedure test according to VdTÜV guideline 1160 including the technical test according to DIN 65228.

Brazing:

Brazing material: Fontargen **AF 314** (Mat.-No. 102135879) for copper-to-copper and copper-to-stainless steel joints

- All pipe ends must be deburred very carefully and loose parts, e.g. shavings, must be removed.
- Thoroughly clean all surfaces to be connected to each other to bare metal (until the material is free of oxide layers).
- Working temperature at approx. 650°C. Do not exceed 700°C!
- While brazing and until cooling down of the joint to below 200°C, the pipes must be purged with nitrogen or argon

Cleaning:

Remove flux residue!

Outer side: Clean with a damp cloth while the brazed joint is still hot.

Inner side:

Cold trap: Rinse for 3 hours with warm water (approx. 80°C). A low flow rate is sufficient.

Refrigerant pipes: Remove the flux residue carefully (rinse). Carefully dry after cleaning.

Exceptional cases: During final assembly cleaning of inaccessible joints can be omitted.

6. Test

1. Water pressure test at 45 bar (1.43 x operating pressure) according to LHH-N 090.216. Pressure must be exerted for 30 minutes. The component complies with the requirements when there is no visible leak, the test pressure remains constant for the test duration and no permanent deformations are present.

2. Blow through with oil-free compressed air.

3. Vacuum test: Evacuation of air to 1 x 10^{-2} mbar.
Warming the cold trap may help to speed up the test (removal of residual moisture).

4. Leak test with helium (HV2, see LHH-N 000.320).

5. Venting with nitrogen or inert gas.

6. Close openings!

Note: No pressure test is conducted on refrigerant pipes, but the entire system must be tested for leaks after completion.

7. Drawing specifications

Drawings must show the following specifications:

- Produced and tested according to LHH-N 090.012.
- Operating pressure
- The location of the serial number identification must be specified in the drawing.

8. Traceability of cold traps

- Each cold trap must be identified by a serial number.
- The manufacturer has to keep test logs and archive them for a duration set by regulations.

9. Specifications in parts list

Enter a label and 4 blind rivets in the parts list for the cold trap. In addition, enter the contents of the fields as a text position under the position of the empty label.

To keep the parts list independent of the date of manufacturing, *"Enter current year"* is entered as text in the "year of manufacturing" field