

**Guideline**

**B-21**

**CLAP**

**FORM N°X004**

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**Directive References:**

Annex I

Annex II

**Subject:** Classification – Unstable gas

**Question:** How does one define an unstable gas as referred to in Tables 1 & 6 of Annex II of PED?

**Answer:** An unstable gas in this context is a gas that is able to decompose either slowly or explosively. In case of the former, the decomposition reaction usually occurs homogeneously over the entire volume whereas in case of the latter, the decomposition reaction – after having been triggered locally by an ignition source – propagates as a self-sustaining reaction front very fast through the entire volume filled with the decomposable gas.

Gases which slowly decompose cause – over time – inevitably a slow increase in pressure if kept inside a gastight enclosure. Examples for such gases are

- diborane (CAS No. 19287-45-7, UN No. 1911) and
- germane (CAS No. 7782-65-2, UN No. 2192).

Gases which decompose explosively cause – after ignition – a sudden pressure increase if kept inside a gastight enclosure.

Generally, these gases are classified as chemically unstable gases according to CLP Regulation (EC) No 1272/2008 as amended. Typical examples of such gases are:

- acetylene (CAS No. 74-86-2, UN No. 1001 and UN No. 3374),
- methylacetylene (CAS No. 74-99-7, UN No. 1060),
- vinyl fluoride (CAS No. 75-02-5, UN No. 1860) and
- ethylene oxide (CAS No. 75-21-8, UN No. 1040).

For further examples, see Table 35.1 in Section 35 of the UN Manual of Tests and Criteria.

Only a few gases which are able to decompose explosively are not classified as chemically unstable according to the abovementioned CLP Regulation. The reason is that CLP classifies only flammable gases as chemically unstable whereas gases which are not flammable are not taken into account for classification as chemically unstable. Examples for such gases are

- ozone (CAS No. 10028-15-6) and
- dinitrogen monoxide (CAS No. 10024-97-2, UN No. 1070, synonyms: nitrous oxide, laughing gas).

NOTE: For unstable fluids in the sense of Annex I, section 2.2.1 see Guideline E-10.