KAS

COMMISSION ON PROCESS SAFETY

at the
Federal Ministry for
Environment, Nature Conservation and Reactor Safety

Short version of Guidance KAS-18

Recommendations for separation distances between establishments covered by the Major Accidents Ordinance (*Störfall-Verordnung*) and areas worthy of protection within the framework of land-use planning – implementation of Article 50 of the Federal Immission Control Act (*Bundes-Immissionsschutzgesetz*, *BImSchG*)

drafted by the working group "Revision of Guidance SFK/TAA-GS-1"

Second revision

KAS-18. K

Preliminary note:

This short version of Guidance KAS-18 “Recommendations for separation distances between establishments covered by the Major Accidents Ordinance (*Störfall-Verordnung*) and areas worthy of protection within the framework of land-use planning – implementation of Article 50 of the Federal Immission Control Act (*Bundes-Immissionsschutzgesetz*)” offers all stakeholders and interested bodies an overview of the scope of application, the results and the non-applicability of the recommendations.

Only the complete version of the guidance shall be used by the competent authorities for decision-making purposes.

Guidance KAS-18 is a revision of Guidance SFK/TAA-GS-1 which had been in use since October 2005. The revision was based on a systematic appraisal of the experience gained in the application of the guidance.

An essential aspect of the revision is that it kept the agreements for determining separation distances. However, the necessary recalculations for acrolein (new ERPG-2 value) and hydrogen chloride (now calculated as liquefied under pressure) have led to significantly greater separation distances. The guidance also addresses in much greater detail aspects of land-use planning in the context of Article 50 of the Federal Immission Control Act (*BImSchG*).

The guidance has the backing of the Technical Commission on Urban Development of the Standing Conference of Federal State Ministers and Senators responsible for Urban Development, Building and Housing (*Bauministerkonferenz*), which puts it on a broader basis.

1. Principles of the Guidance

For the purpose of implementing Article 12 of the Seveso II Directive, appropriate separation distances are to be maintained in the long term between establishments and risk receptors as defined in the directive. The guidance provides separation distance recommendations and assessment methods in order to ensure, at the planning level, that areas with incompatible usages are kept at an appropriate distance from one another.

The requirements of Article 12, paragraph 1, of the Seveso II Directive were transposed in German law primarily through Article 50, first sentence, of the Federal Immission Control Act (*BImSchG*) and by amending Article 9, paragraph1, no. 24, of the Federal Building Code (*Baugesetzbuch, BauBG*). Appropriate separation distances are a means of preventing, as far as possible, major accidents in an establishment of having an effect on neighbouring sensitive areas.

The guidance and its separation distance recommendations apply in particular to the following planning scenarios:

- identification of new building zones for establishments,
- identification, by means of planning law, of sites for extensions to existing establishments,
- sensitive usages moving closer to existing establishments.

The separation distance recommendations only apply to human risk receptors. Other risk receptors under Article 50, first sentence, of the Federal Immission Control Act (*BImSchG*) are not covered.

The guidance and its separation distance recommendations do not apply to:

- the licensing of individual projects inside establishments,
- existing developments,
- external emergency planning.

When the recommended separation distances are respected or exceeded, it can generally be assumed that prevention at the planning level has been sufficient in order to limit as much as possible the effects of major accidents, and that the planning-related protection objective stipulated in Article 50 of the Federal Immission Control Act (*BImSchG*) is met. The zones resulting from the separation distance recommendations should not be understood as areas free of buildings. Within these zones less sensitive areas/usages than those described in Article 50, first sentence, of the *BImSchG* may be planned. The guidance contains advice on which usages and/or objects are to be considered sensitive within the meaning of Article 50, first sentence.

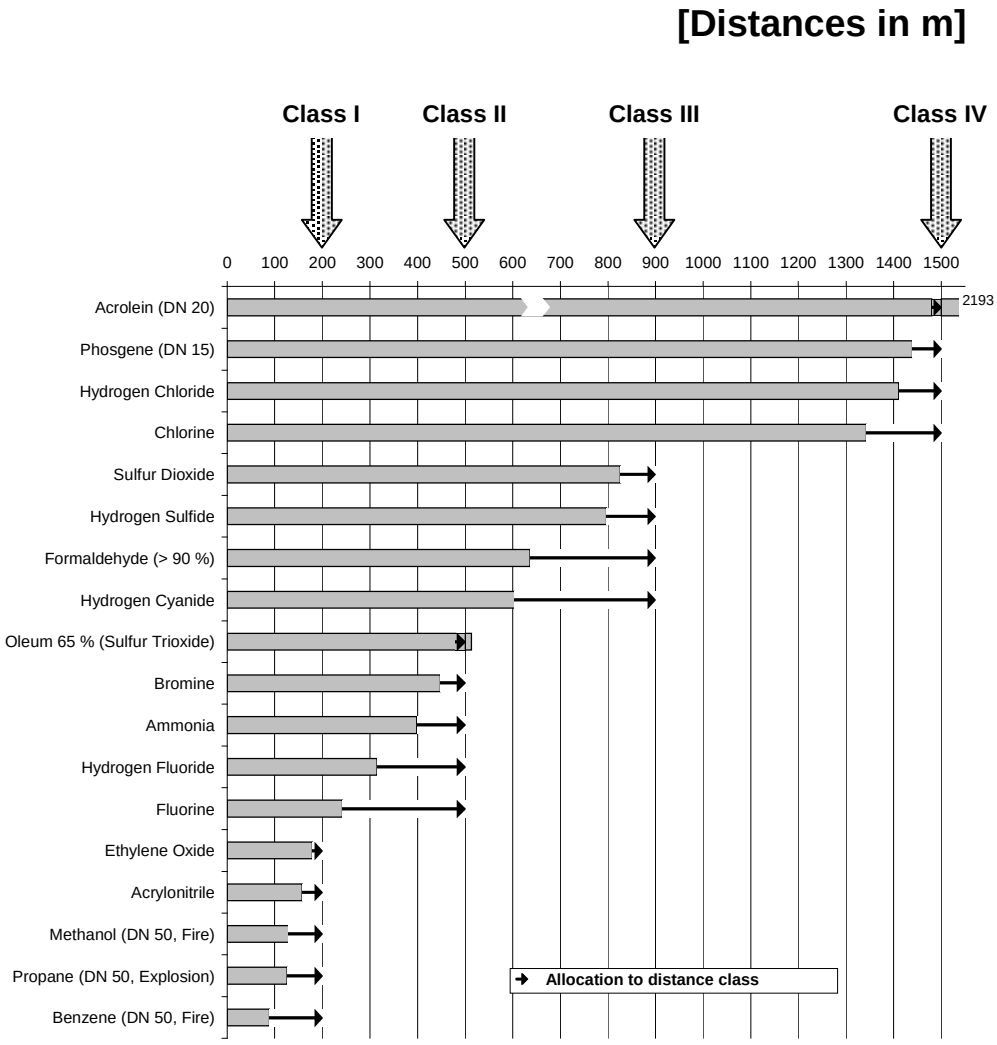
The separation distance recommendations are to be considered as reference values. They are based on an analysis by categorization.

2. Separation Distance Recommendations for newly planned establishment sites without detailed knowledge ("greenfield sites") and for extensions thereof

With respect to this planning scenario, it is presumed that future usages of the sites are unknown at the time of planning (planning without detailed knowledge). This makes it impossible to take into account any active or passive protection measures when assessing the determined separation distances.

The separation distance recommendations rely on a deterministic approach in line with Germany's major accidents law. On the basis of long-term operating experience and as a result of an analysis of the major accidents of the last decades in Germany (compare ZEMA reports), the assumed source terms for the accidental release of selected hazardous substances correspond as a general rule to a release area of 490 mm² (roughly equivalent to the cross-sectional area of a DN 25 pipe). The assumed scenarios are fire/gas cloud explosion with immediate ignition and release of toxic substances; the assumed end-points are a threshold value of 1.6 kW/m² for thermal radiation, of 0.1 bar for explosions and the ERPG-2 value for toxic substances. The dispersion model used was VDI Guideline 3783. With respect to the dispersion conditions for hazardous substances, average meteorology (including a wind speed of 3 m/s) and a typical industrial topology (uniform buildings) were assumed.
The separation distance recommendations refer to planning on level terrain and to average dispersion conditions. Deviation from the recommendations might prove necessary subject to local conditions in particular.
The specific properties of the substances involved as well as handling conditions result in variable release rates for the scenarios under consideration. For this reason there is no simple relationship between toxicity, thermal radiation load or pressure load on the one hand and the recommended separation distance on the other. Substances have therefore been grouped into separation distance classes. The results for important representative substances are shown in figure 1, details can be found in the full version of the report (KAS-18).

Figure 1: Separation distance recommendations for land-use planning without detailed knowledge[1]



[1] *The change in the ERPG-2 value for phosgene from 0.2 to 0.5 ppm has not yet been taken into account.*

3. Planning in the vicinity of existing establishments

The separation distance recommendations give guidance as to whether a further reduction in the separation distance between an establishment and a sensitive area might put at risk the planning principle of Article 50 of the *BImSchG*. The recommended distances are to be understood as consultation distances. If separation distances are less than the consultation distances, the concrete situation and condition of the establishment must be assessed to determine the appropriate distance in the concrete planning case.

For new developments in the vicinity of existing establishments, the hazard potential emanating from the establishment is known or can be evaluated (planning with detailed knowledge). It is possible to conduct a specific individual case study including a systematic hazard analysis.

The following recommendations are made with regard to the incidents[2] on which the individual case study is to be based:

- The total loss of inventory, the loss of the largest continuous volume, the bursting of a container and the rupture of very large pipes are not taken into consideration for the purpose of land-use planning as these events are too improbable to occur under state-of-the-art conditions in safety technology.
- For storage in transport containers or in pressure receptacles, the release of the contents of a transport container or a pressure receptacle (for example a gas bottle) is to be taken into account. In this context, assumptions must include the rupture of the pressure receptacle's valve (leakage size of 80 mm^2) and the complete emptying of liquid-filled transport containers (leakage size of 490 mm^2) followed by pool evaporation.
- For process installations and storage facilities it is to be assumed that leaks from pipe work, containers, safety equipment, etc. might occur.
    - In general a leakage area of 490 mm^2 (corresponding to an equivalent diameter of 25 mm) is assumed as a starting point.

[2] The incidents correspond to a beyond-design accident (*Dennoch-Störfall*) pursuant to no. 9.2.6.2.3. of the implementation aid for the Major Accidents Ordinance (*Störfall-Verordnung*), BMU (ed.), Bonn 2004

- An individual case study is carried out to determine the leakage area on which the assessment is to be based. This study takes into account the technical systems which are effectively in place.
- It is recommended to assume a leakage size of at least 80 mm² corresponding to an equivalent diameter of 10 mm.
- Technical systems or organisational measures that limit the consequences of an accident must be taken into consideration if they are not disrupted by the underlying events.

The relevant scenarios – substance release, fire or explosion - have to be considered separately depending on the relevant properties of the substances involved. The following rules are to be observed in the impact assessment:

- Mass flow must be calculated according to operational conditions and under the assumption of a sharp-edged leakage (discharge coefficient of 0.62).
- The assumed ambient temperature is 20°C.
- Assumed weather conditions are average conditions according to VDI directive 3783 with indifferent thermal stratification and without inversion. The most frequent wind speed in weather conditions with indifferent thermal stratification must be determined for the establishment in question (e.g. DWD). This value will be used in the calculations.
- The assumed end-points are the same values as those used for determining the distances in the case of planning without detailed knowledge (ERPG-2 value /1.6 kW/m²/ 0.1 bar).

- The appropriate separation distance in an individual case corresponds to the dispersion radius at the point where the assumed end-point of the relevant scenario is reached.
- If other regulations (e.g. *SprengG*, technical instructions) stipulate minimum distances for the installation type in case, these distances are to be taken into account if they exceed the recommended distances.

If the authority cannot carry out the individual case study by itself, it is recommended that it uses a qualified expert for this task, e.g. an expert designated according to Article 29a of the *BImSchG*. It is recommended that the task description should be drafted in close cooperation with the immission control authority.

The guidance contains statements on issues to which the expert opinion should respond.

4. Application of the Guidance to other planning scenarios

The guidance also addresses the following planning scenarios:

- application in land-use planning,
- extension of establishment surfaces in the vicinity of sensitive areas,
- setting of sensitive areas in the vicinity of existing establishments
- consideration in planning-approval procedures,
- building law-related projects in the vicinity of existing establishments,
- urban planning in mixed-use areas.

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