

GERMAN GUIDELINE TO ACHIEVE HARMONISATION AND TO ENSURE QUALITY STANDARDS IN ATMOSPHERIC DISPERSION MODELLING

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INTRODUCTION

In Germany, special guidelines according the model implementation and document requirements of atmospheric dispersion studies within licensing procedure have been developed recently.

The initial point was a very large variety of approaches, documentation and scientific quality in expert reports, even though the method of dispersion modelling has been defined very precisely in German legislation (Technical Instructions on Air Quality Control, in Germany called “TA Luft”, last update in 2002).

In the past, basic information, e.g. meteorological data or the derivation of emission rates, had been omitted and therefore the reports were not comprehensible and not reproducible for governmental controllers.

Even if the documentation was complete, way too many different structures of reports complicated the effective understanding of studies.

With the guidelines, a harmonisation process in practical dispersion modelling in both structure and quality of reports, has been started.

Another very important aim of the implementation of the guideline was to achieve a certain kind of comparable treatment of applicants in licensing procedure.

DEMANDS ACCORDING TO THE TECHNICAL INSTRUCTIONS ON AIR QUALITY CONTROL (2002)

In comparison with the former Technical Instruction on Air Quality Control of 1986, the revised and updated Version of 2002 defines considerable lower values for the emission-mass-flows accounted to be of “no-significance”. Likewise, the criteria to evaluate ambient air quality (often called “Immission”, by dispersion modelling) have been more tightened as well.

Therefore, the calculation of ambient air quality by means of dispersion modelling is more and more often required in licensing procedures of facilities and plants especially of types mentioned in the 4th Ordinance for the Implementation of the Federal Air Quality Control Act. Consequently, authorities and especially the checking officials will be increasingly faced with expertises containing dispersion modelling matters, which are sometimes not easy to understand or comprehensible for a “No-expert”. But nevertheless such expertises have to be correct, complete, comprehensible, and of a certain standard quality.

Even officials with few experience only should be able to check those requirements and the reasonable use of methods fast and easily.

Therefore three local governments (1st Baden-Wuerttemberg (2004), 2nd North Rhine-Westphalia (2006) and later 3rd Saxony) developed a guideline which enables authorities and their officials to revise expertises in suitable time and according to standardized criteria.

These more or less comparable local guidelines were brought together in a new VDI Guideline VDI 3783 Part 13. “Quality Control for Dispersion Modelling - Plant-related Dispersion Modelling according to the Technical Instructions on Air Quality Control”.

This guideline had been worked out up to now as a draft (so called Green Print) and will be officially released (so called “whiteprint”) probably at the beginning of 2008.

This VDI-Guideline will contain a lot of items to be checked and a complete list of details, which are mandatory to be described in dispersion modelling expertises. An example of the coming checklist is given in Figure 1a/b.

Naturally, this guideline is not only a tool for authorities and their officials. Consultants and experts are invited to use the guideline as well, e.g. to arrange the structure of their text and to ensure the completeness of their specifications.

Perhaps this guideline might become a milestone in Germany and even in Europe for technical handling and completeness of documentation for dispersion modelling in the future.

Check Points Expertise (headlines only)	False	Worked out	Comprehensible
Description of the task			
Description of local relations			
Description of the facility			
Calculation of stack height			
Description of sources and emissions			
Parameter of modelling (area of inspection)			
Meteorological data			
Regard to topography			
Special cases: e.g. prognostic wind field			
Presentation of results			
Used measurement reports, technical rules, ordinances, literature given complete?			
Annex: Input data and protocol of dispersion model software given complete?			

Fig. 1; Headlines (only) of the checklist for authorities and their officials to control the quality of dispersion modelling expertise.

Prüfpunkte	vorhanden	vollständig	plausibel
Aufgabenstellung	<input type="checkbox"/>		
Beurteilungsgrundlagen dargestellt	<input type="checkbox"/>	<input type="checkbox"/>	
Beschreibung der örtlichen Verhältnisse	<input type="checkbox"/>		<input type="checkbox"/>
Pläne dargestellt	<input type="checkbox"/>	<input type="checkbox"/>	
Emissionen	<input type="checkbox"/>		
Beschreibung des Betriebes	<input type="checkbox"/>		
Beschreibung der Quellen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Koordinaten (xq, yq), Ausdehnung (aq, bq, cq) und Ausrichtung (wq), Höhe (hq) der Quellen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emissionen (Angabe über Stoffname, z. B. NO, NO_2 , etc.) und zeitliche Charakteristik („?“ nach dem Stoffnamen)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Überhöhung (Angabe des Wärmestroms qq) berücksichtigt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spezialfall Stäube (Angabe $PM-1, PM-2$, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weitere Eingangsgrößen	<input type="checkbox"/>		
Rechengebiet: Radius (Produkt $n_x \cdot dd, n_y \cdot dd$ muss mindestens 50 \cdot größte Schornsteinhöhe betragen)	<input type="checkbox"/>		<input type="checkbox"/>
Räumliche Auflösung: Rasterschrittweite (dd) < Schornsteinhöhe (innerhalb 10 Schornsteinhöhen)	<input type="checkbox"/>		<input type="checkbox"/>
Rauigkeitslänge (Corine bzw. $z0$)	<input type="checkbox"/>		<input type="checkbox"/>
Statistische Sicherheit (qs)	<input type="checkbox"/>		<input type="checkbox"/>
Meteorologische Daten	<input type="checkbox"/>		
Lage der Messstelle beschrieben, räumliche Repräsentanz begründet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Häufigkeitsverteilung der Windrichtungen dargestellt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Koordinaten des Windmessgerätes (x_a, y_a), Höhe (h_a) des Windmessgerätes über Grund			
Zeitreihe verwendet (sinnvoll bei zeitabhängigen Emissionen) und Auswahl des Jahres der Zeitreihe begründet oder Ausbreitungsklassenstatistik verwendet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wesentliche Einflüsse von lokalen Windsystemen vorhanden und keine am Standort gemessene Meteorologie \Rightarrow Sonderfallbetrachtung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Berücksichtigung von Bebauung und Gelände	<input type="checkbox"/>		
Höhendifferenzen zum Emissionsort von mehr als dem 0,7fachen der Schornsteinbauhöhe und Steigungen (bezogen auf 2 \cdot Schornsteinbauhöhe) von mehr als 1 : 20 \Rightarrow Gelände ist zu berücksichtigen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steigungen (Steilheit) größer 1 : 5 vorhanden (bei 50 m Schornstein beispielsweise mehr als 20 m auf 100 m Entfernung) \Rightarrow Sonderfallbetrachtung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sind Bauwerke im Abstand < 6 \cdot Schornsteinbauhöhe vorhanden, die größer als 1,2 \cdot Schornsteinbauhöhe sind \Rightarrow Bebauung ist zu berücksichtigen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn Schornsteinbauhöhe weniger als das 1,7fache der Gebäudehöhen und freie Abströmung gewährleistet, diagnostisches Windfeldmodell, ansonsten Sonderfallbetrachtung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verwendetes Ausbreitungsmodell bzw. verwendete Windfeldmodelle anstelle/zusätzlich zu AUSTAL2000	<input type="checkbox"/>		
Wurde zum Zeitpunkt der Gutachtenerstellung aktuelle AUSTAL2000-Version verwendet http://www.austal2000.de/changes.htm	<input type="checkbox"/>		<input type="checkbox"/>
Begründung der Eignung und Beschreibung der Vor- und Nachteile des Modells gegenüber AUSTAL2000		<input type="checkbox"/>	<input type="checkbox"/>
Ergebnisse	<input type="checkbox"/>		
Ergebnisse grafisch dargestellt	<input type="checkbox"/>		
Ergebnisse erörtert	<input type="checkbox"/>	<input type="checkbox"/>	
Prüfung auf Einhaltung der Immissionswerte – Zusatzbelastung irrelevant – Zusatzbelastung > Irrelevanzgröße: \Rightarrow Darstellung der Vorbelastung \Rightarrow Bewertung der Gesamtbelastung (nach TA Luft Kap. 4.9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Literatur vollständig	<input type="checkbox"/>	<input type="checkbox"/>	
Eingangsdaten und Protokolle des Rechenlaufs im Anhang	<input type="checkbox"/>		

Fig. 2b; Checklist for authorities and their officials to control the quality of dispersion modelling expertise (1st German Original).

REFERENCES

- VDI 3783 Part 13. "Quality Control for Dispersion Modelling - Plant-related Dispersion Modelling according to the Technical Instructions on Air Quality Control". Status edited and published May 2007.
- Leitfaden zur Beurteilung von TA Luft Ausbreitungsberechnungen in Baden-Württemberg, Landesanstalt für Umweltschutz Baden-Württemberg. Verlagsauslieferung der LfU JVA Mannheim – Druckerei Herzogenriedstr. 111 in 68169 Mannheim.
- Leitfaden zur Erstellung von Immissionsprognosen mit AUSTAL2000 in Genehmigungsverfahren nach TA Luft und der Geruchsimmisions-Richtlinie. Merkblatt 56, Landesumweltamt Nordrhein-Westfalen. 2006