Checklist for creating a wind field library

Project:
Author:

Date:

Section in VDI 3783 Part 16	Check item	N/A	Applicable/ performed	Section/ page in the expert report
1	**Scope of application**			
	Prognostic wind field model			
	Wind field model in accordance with the requirements of VDI 3783 Part 7?		☐	
	Expertise and extensive experience with mesoscale prognostic wind field models have been demonstrated (e.g. references)?		☐	
5.2	**Constructing and testing prognostic model areas**			
	Meteorological data			
	Meteorological data represent the regional topographic effects?		☐	
	TA Luft model grid			
	Calculation area and calculation grid for the air quality prediction defined with the TA Luft model as specified by TA Luft?		☐	
	Wind field model grid			
	Relevant terrain elevations documented and dataset choice substantiated?		☐	
	Relevant roughness lengths and their up-to-dateness documented and choice of dataset substantiated?		☐	
	Vertical extension of the wind field model at least 5 km plus the boundary points?		☐	
	Horizontal domain size of the wind field model is three times the extension of the calculation area for the air quality prediction as per TA Luft, but at least 15 km × 15 km plus the boundary points?		☐	
	In the area of the wind field model, all significant topographic structures have been recorded that can affect the flow in the calculation area of the TA Luft model but are not included in the data of the meteorological time series?		☐	
	Requirements of VDI 3783 Part 7 regarding minimum grid widths are met?		☐	
	If the grid width of the wind field model is greater than those of the TA Luft model: all the terrain structures relevant for the dispersion resolved with at least three grid points?	☐	☐	
	If there is deviation from the above point: has this been technically justified?	☐	☐	
	At least ten edge-parallel rows midway between the outer margin of the wind field model and the TA Luft calculation area?		☐	

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	Smoothing the margins			
	Terrain elevation at the margins of the model grid have been smoothed as specified by the standard (three-point filter, weights as specified, at least ten applications over at least ten rows)?		☐	
	Case 1: Smoothing with the standard's downloadable program?	☐	☐	
	Case 2: Smoothing with some other implementation as per the standard?	☐	☐	
	Testing the model domains			
	It has been demonstrated, through test calculations over several approach flow directions and stabilities, that with the chosen model grid the expected topographic effects on the flow in the calculation area of the TA Luft model are adequately resolved and the calculations are numerically stable?		☐	
	General description without detailed results of the test calculations		☐	
	Have the requirements of VDI 3783 Part 7 as regards quality control of the model calculations been complied with?		☐	
5.3	**Prognostic model calculations**			
	Generating the sampling points			
	72 prognostic model calculations (18 wind directions at 20° intervals, starting with approach flow from the north in each of the stability classes I, II, III/1 and V) performed and resulting wind fields used as sampling points for the interpolation in parameter space?	☐	☐	
	Justification provided for using a different procedure	☐	☐	
	Driving data			
	Calculated values of the potential temperature gradient (below ca. 1500 m above ground) and of the geostrophic wind speed from Table 1 of the standard have been used?		☐	
	Above ca. 1500 m above ground: ICAO standard atmosphere used?		☐	
	If a model-specific requirement: other driving data explained, consistency with data of Table 1 discussed?	☐	☐	
	Quality control			
	Individual checking of every model calculation for plausibility and perturbations carried out?		☐	
	General description without detailed results		☐	
	Consistency testing of all model calculations in parameter space carried out?		☐	
	General description without detailed results		☐	
5.4	**Interpolation in parameter space**			
	Sufficient number of sampling points for bilinear interpolation in parameter space?		☐	
	If the prerequisites for bilinear interpolation have been met, were missing wind fields been generated by bilinear interpolation as per the standard?	☐	☐	
	If the prerequisites for bilinear interpolation have not	☐	☐	

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	been met, has an alternative $1/r^2$ interpolation as per the standard been used?			
	If the prerequisites for bilinear interpolation have not been met, has an alternative interpolation procedure been used and justified?	☐	☐	
5.5	**Interpolation to the grid of the TA Luft model**			
	Grid definition			
	Were wind components assigned to the exact position of the grid points (with offset were necessary, e.g. with the Arakawa C-grid, non-equidistant grids allowed for)?		☐	
	Vertical interpolation			
	Linear interpolation of the Cartesian components between the layers of the wind field model?		☐	
	Interpolation between the ground and the first reference surface of the wind field model at least with logarithmic wind profile in the case of neutral stratification?		☐	
	Documented interpolation between the ground and the first reference surface of the wind field model with stability-dependent logarithmic wind profiles (e.g. VDI 3783 Part 8)?	☐	☐	
	Horizontal interpolation			
	Horizontal interpolation as per the standard done solely within the model layers of the TA Luft model?		☐	
	If the grid width in the target grid is smaller than the grid width in the starting grid: bilinear interpolation of the Cartesian components in x- and y-direction?	☐	☐	
	If the grid width in the target grid is smaller than the grid width in the starting grid: area-weighted interpolation of the Cartesian components as per the standard?	☐	☐	
5.6	**Calculation of a final wind field library**			
	Non-divergent wind field calculated, and method stated?		☐	
	Modification of the wind field by buildings allowed for and method stated?	☐	☐	
6.1	**Defining the substitute anemometer position**			
	Alternative 1: procedure in accordance with the standard			
	Reference profiles calculated with the same model as the wind field library in accordance with the standard's requirements?		☐	
	EAP defined with the standard's downloadable program TAL-Anemo?	☐	☐	
	EAP defined and documented with a different implementation of the procedure as per the standard?	☐	☐	
	Case 1: A unique EAP is found with the above method and will be used?	☐	☐	
	Case 2: An unique EAP could not be found. Final EAP will be defined using the substitute anemometer height as per Section **Fehler! Verweisquelle konnte nicht gefunden werden.**.	☐	☐	

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	Alternative 2: different procedure			
	EAP defined differently and the technically justified procedure documented?	☐	☐	
	It has been verified that at the EAPs there is rotation of the wind at the anemometer height in the same sense as the rotation of the driving wind direction?		☐	
6.2	**Defining the substitute anemometer height**			
	Roughness within a radius of 200 m from the EAP defined as per Section **Fehler! Verweisquelle konnte nicht gefunden werden.** (if necessary, differently for the height levels between ground and 100 m)?		☐	
	For each roughness, associated substitute anemometer height read from the meteorological time series?		☐	
	Validity heights of the EAPs (in accordance with the evaluated model level) and substitute anemometer heights checked for agreement?		☐	
	Case 1: Only one valid combination of EAP and substitute anemometer height found and selected?	☐	☐	
	Case 2: Several valid combinations of EAP and substitute anemometer heights found and a technically justified selection made?	☐	☐	
	Case 3: No valid combination of EAP and substitute anemometer height found or the above deviated from. selection of the final EAP and substitute anemometer height technically justified?	☐	☐	
	The EAPs used			
	Are EAPs and substitute anemometer height stated?		☐	