

**Report VGB-TW804e**  
**Centralized Reliability and Events Database**  
**Reliability Data for Nuclear Power Plant Components**  
**Analysis for 2004**

**Preface**

The aim of this publication is to provide reliability data that can be used in ongoing and future probabilistic safety analyses (PSAs) conducted by the owners/operators of nuclear power plants contributing to the Centralized Reliability and Events Database (ZEDB<sup>1</sup>).

As far as the preparation and use of plant-specific PSAs is concerned, there is a growing need for the generic data records used in the past to be replaced with reliability data based on current operating experience with the equipment concerned.

The Centralized Reliability and Events Database (ZEDB) was set up by the Technical Association for the Generation of Electricity and Heat (VGB) to meet this need. This database gathers and analyzes operating experience gained at a large number of nuclear power plants. The first database analysis carried out in 1999 produced reliability data on pumps, emergency diesel generators and valves. The data corresponded to a cumulative total of more than 9000 operating years in the case of the valves, 3700 operating years in the case of the pumps and more than 900 operating years for the emergency diesels. This constituted an important initial step towards establishing a

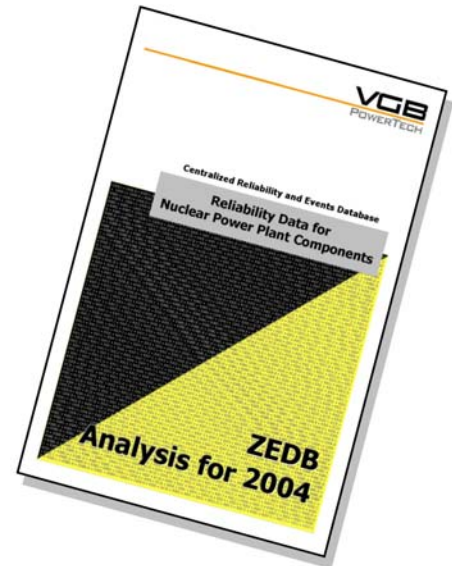
reliable set of data based on the operating experience of participating nuclear plants.

In the second analysis conducted in the year 2000, the calculations performed during the first analysis were updated according to the greater operating experience available by that time. At the same time, batteries, rotating inverters, static converters and transformers were added as new component prototypes. The analysis in the year 2000 covered around 22,000 operating years in the case of the valves, over 6900 years for the pumps and more than 1100 years in the case of the emergency diesel generators. The operating experience available for the new component prototypes included in the year 2000 analysis amounted to more than 2100 years for the batteries, approximately 350 years for the rotating inverters, around 2400 years for the static converters and approximately 1800 years for the transformers.

The third analysis, conducted in 2002, constituted a further update of the previous analysis using the larger amount of operating experience now available, and once again expanded its scope to include more components. The 2002 analysis, for example, additionally contained fans, busbars and circuit breakers. In other words, the operating experience available for the 2002 analysis corresponded to approximately 32,500 operating years for the valves, 13,400 years for the pumps, 3500 years for the fans, 1500 years for the emergency diesels, 3100 years for the batteries, 470 years for the rotating inverters, 3900 years for the static converters, 2800 years for the transformers, 6500 years for the busbars and 9600 years for the circuit breakers.

Once again, the 2004 analysis described in this publication is a continuation of its predecessor and incorporates new operating experience and a larger number of components. Also, additional populations were created for the valves. In the case of the pumps, certain components that had already been examined on the basis of their technical characteristics were now grouped into further populations oriented solely according to the actual function performed by these components.

The operating experience available for the 2004 analysis corresponded to approximately 51,400 operating years for the valves, 16,000 years for the pumps, 4800 years for the fans, 1800 years for the emergency diesels, 4600 years for the batteries, 640 years for the rotating inverters, 5600 years for the static converters, 4100 years for the transformers, 10,100 years for the busbars and 19,400 years for the circuit breakers.



<sup>1</sup> ZEDB is the abbreviation for the German name of this database, *Zentrale Zuverlässigkeits- und Ereignisdatenbank*.

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**Imprint**

Published by: VGB PowerTech e.V.  
- ISSN 1439-7498 -

Available from: VGB PowerTech Service GmbH  
Verlag technisch-wissenschaftlicher Schriften  
P.O. Box 10 39 32, D-45039 Essen

Price: 299,00 Euro (+ postage and VAT)

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VGB PowerTech Service GmbH  
Verlag technisch-wissenschaftlicher Schriften  
P.O. Box 10 39 32  
D-45039 Essen  
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