

## Centralized Reliability and Events Database

### Reliability Data for Nuclear Power Plant Components - June 2010

3<sup>rd</sup> upgrading to VGB-TW805e

#### Preface

The Centralized Reliability and Events Database (ZEDB) provides 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 database.

In connection with the preparation and application of plant-specific PSAs, a need exists for plant-specific 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 Power and Heat Generation (VGB) to meet this need. This database gathers and analyzes operating experience gained at a large number of nuclear power plants.

In 1999 an analysis was performed for the first time of some of the operating experience stored in the ZEDB, the results of this analysis being published in a data book.

Further analyses followed in 2000, 2002 and 2004, during which time there was an increase in both the number of analyzed components and the scope of operating experience.

As of December 2006, the format used for publishing the ZEDB analysis results has been changed over to the looseleaf compilation presented here. Now it is possible to update the analysis results to incorporate new operating experience and to expand the scope of analyzed components by supplying looseleaf sheets to replace or supplement the previous contents, without having to publish the entire data book again.



#### Contents

##### Revision Sheet

##### 3 Data Content of ZEDB Database

- 3.1 Data Acquisition and Quality Assurance
- 3.2 Component Master Data
- 3.3 Event Reports
- 3.4 Operating Reports
- 3.5 Component Boundaries

##### Data Tables

##### A Valves

- A.1 Check Valves
- A.1.1 Check Valve with Nominal Size > 50
- A.1.2 Check Valve with Nominal Size ≤ 50
- A.1.3 Swing Check Valve
- A.1.4 Check Valve, Lockable in Closed Position

- A.1.5 Swing Check Valve for Essential Service Water with Nominal Size ≥ 250
- A.1.6 Swing Check Valve for Essential Service Water with Nominal Size < 250
- A.1.7 Check Valve with External Motor for Opening
- A.1.8 Check Valve with Locking Piston for Closure
- A.1.9 Non-Restricted Check Valve
- A.1.10 Check Valve, Lockable in Closed Position, Motor-Operated
- A.2 Motor-Operated Isolation Valves
- A.2.1 Main Steam Relief Isolation Valve
- A.2.3 Reactor Water Cleanup System Containment Isolation Valve
- A.2.9 Steam Generator Blowdown System Trim Valve
- A.2.10 Isolation Valve of Small Nominal Size in BWR

## Centralized Reliability and Events Database

### Reliability Data for Nuclear Power Plant Components - June 2010

3<sup>rd</sup> upgrading to VGB-TW805e

#### Contents *(continued)*

A.3	System-Fluid-Operated Isolation Valves
A.3.1	PWR Main Steam Isolation Valve
A.3.2	BWR Main Steam Isolation Valve
A.3.3	Turbine Stop Valve
A.3.4	Main Steam Relief Isolation Valve
A.4	Motor-Operated Gate Valves
A.4.2	Main Steam Relief Isolation Valve
A.4.4	Low-Load Feedwater Isolation Valve/ Emergency Feedwater Isolation Valve
A.4.10	Service Water System Isolation Valve
A.4.11	Motor-Operated Isolation Valve on the Pressure Side of the Main Feedwater Pump
A.4.12	Motor-Operated Isolation Valve on the Suction Side of the Main Feedwater Pump
A.5	System-Fluid-Operated Gate Valves
A.5.1	Main Steam Isolation Valve
A.6	Motor-Operated Shutoff Valves
A.6.1	Nuclear Component Cooling Water Shutoff Valve
A.6.4	Nuclear Component Cooling Water Control Butterfly Valve
A.7	Hydraulically Operated Shutoff Valves
A.7.1	Nuclear Component Cooling Water Quick-Closing Shutoff Valve
A.10	System-Fluid-Operated Multiport Valves
A.10.1	High-Pressure Coolant Injection Valve
A.11	Safety Valves
A.11.1	Main Steam Safety Valve
A.11.2	Safety-Relief Valve
A.11.3	Pressurizer Relief Valve
A.11.4	Pressurizer Safety Valve
A.11.5	Spring-Loaded Main Steam Safety Valve
A.12	Heating, Ventilation and Air-Conditioning (HVAC) Valves
A.12.1	HVAC Containment Isolation Valve
A.12.2	HVAC Containment Isolation Damper
A.13	Pilot Valves of Shutoff Valve Type
A.13.1	Spring-Loaded Pilot Valve for Pressurizer Valves
A.13.2	Spring-Loaded Pilot Valves for Main Steam Valves
A.13.3	Spring-Loaded Pilot Valve for Safety-Relief Valves
A.13.4	Solenoid Pilot Valve for Pressurizer Relief Valves
A.13.6	Normally Deenergized Solenoid Pilot Valve for Main Steam Valves
A.13.7	Normally Energized Solenoid Pilot Valve for Main Steam Valves
A.13.9	Solenoid Pilot Valve for Demineralized Water
A.13.10	Air-Operated Pilot Valve
A.13.13	Normally Energized Solenoid Pilot Valve for Quick-Closing Shutoff Valves
A.14	Pilot Valves of Multiport Valve Type
A.14.1	Solenoid Pilot Valve for Air
A.14.2	Solenoid Pilot Valve for Oil

<b>B</b>	<b>Pumps</b>
B.1	Motor-Driven Centrifugal Pumps
B.1.1	Fluid Pumped: Demineralized or Borated Water
B.1.1.12	Canned Motor Pump
B.1.1.13	Fuel Pool Cooling Pump
B.1.1.18	Emergency Component Cooling Water Pump (PWR)
B.1.1.19	Component Cooling Water Pump (PWR / BWR)
B.1.1.21	Secured Closed Cooling Water Pump
B.1.1.22	Main Condensate Pump
B.1.1.23	Main Feedwater Pump
B.1.2	Fluid Pumped: Normal Water
B.1.2.1	Pump Group Population 7
B.1.2.2	Pump Group Population 8
B.1.2.3	Pump Group Population 9
B.1.2.4	Pump Group Population 10
B.1.2.5	Well Pump
B.2	Diesel-Driven Centrifugal Pumps
B.2.1	Fluid Pumped: Demineralized or Borated Water
B.2.1.1	Safety Injection Pump
B.2.1.2	Emergency Feedwater Pump
B.3	Turbine-Driven Centrifugal Pumps
B.3.1	Fluid Pumped: Demineralized or Borated Water
B.3.1.1	Coolant Injection Pump
B.3.1.2	Emergency Feedwater Pump
B.5	Motor-Driven Diaphragm Pumps
B.5.1	Fluid Pumped: Demineralized Water
B.5.1.1	Seal Water Pump
B.6	Motor-Driven Gear Pumps
B.6.1	Fluid pumped: Oil
B.6.1.1	Oil Pump
<b>C</b>	<b>Fans</b>
C.1	Fans of 0.11 – 4.0 KW Capacity
C.2	Fans of 5.5 – 45 KW Capacity
C.3	Fans of 55 – 145 KW Capacity
<b>D</b>	<b>Emergency Diesel Generators</b>
D.1	Emergency Diesel Generator of 320 – 1740 KW Capacity
D.2	Emergency Diesel Generator of 2682 – 5000 KW Capacity
<b>E</b>	<b>Vessels / Tanks</b>
E.1	Accumulator
E.2	Flooding Tank
E.3	Centralized Scram Tank
E.4	One-on-One Scram Tank
E.5	Nitrogen Tank for One-on-One Scram Tank
<b>F</b>	<b>Heat Exchangers</b>
F.1	Residual Heat Removal Heat Exchanger
F.2	Nuclear Component Closed Cooling Water Heat Exchanger

VGB-TW805e-11

## Centralized Reliability and Events Database

### Reliability Data for Nuclear Power Plant Components - June 2010

3<sup>rd</sup> upgrading to VGB-TW805e

#### Contents *(continued)*

##### **G Control Rods**

- G.1 PWR Control Rod
- G.2 BWR Control Rod

##### **H Batteries**

- H.1 Batteries Rated For 24 – 48 V
- H.2 Battery Rated For 220 V

##### **I Rotating Inverters**

- I.1 Rotating Inverter

##### **J Static Converters**

- J.1 24 V Rectifier
- J.2 220 V Rectifier
- J.3 220 V Inverter
- J.4 400 V Inverter

##### **K Transformers**

- K.1 Generator Transformer
- K.2 Three-Winding Standby Offsite Power System Transformer
- K.3 Two-Winding Standby Offsite Power System Transformer
- K.4 Three-Winding Auxiliary Power Transformer
- K.5 Two-Winding Low-Voltage Transformer
- K.6 Three-Winding Low-Voltage Transformer
- K.7 Two-Winding Low-Voltage Transformer
- K.8 Two-Winding Voltage Stabilizer

##### **L Busbars**

- L.1 Busbar 20 – 30 KV, Alternating Current
- L.2 Busbar 6 – 10.5 KV, Alternating Current
- L.3 Busbar 400 – 660 V, Alternating Current
- L.4 Busbar 220 V, Direct Current
- L.5 Busbar 24 – 48 V, Direct Current

#### Imprint

Published by: VGB PowerTech e.V.  
ISSN 2191-9534

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

Price: 299 EUR (+ postage and VAT)

Contact: André Seidel  
VGB PowerTech e. V.  
Kernkraftwerke  
Klinkestr. 27 – 31  
45136 Essen  
Germany  
Phone: +49 (0) 2 01 81 28-291  
Fax: +49 (0) 2 01 81 28-345  
Mail: andre.seidel@vgb.org

Jürgen Zimander  
VGB PowerTech Service GmbH  
Verlag technisch-wissenschaftlicher Schriften  
P.O. Box 10 39 32  
45039 Essen  
Germany  
Phone: +49 (0) 2 01 81 28-200  
Fax: +49 (0) 2 01 81 28-329  
Mail: mark@vgb.org