

# DIN 25475-2:2009-05 (E)

## Nuclear facilities - Operational monitoring - Part 2: Vibration monitoring for early detection of changes in the vibrational behavior of the primary coolant circuit in pressurized water reactors

---

<b>Contents</b>		<b>Page</b>
Foreword .....		3
1	Scope .....	3
2	Normative references .....	3
3	Terms and definitions .....	4
4	Description of the monitoring technology .....	4
5	Requirements of the vibration monitoring system .....	7
5.1	Basic structure and interpretation criteria .....	7
5.2	Data acquisition .....	9
5.2.1	General .....	9
5.2.2	Selecting locations and installing the transducers and cables .....	9
5.2.3	Example of a data acquisition .....	12
5.3	Signal conditioning .....	18
5.4	Signal analysis .....	19
5.5	Signal presentation .....	19
5.5.1	Display unit .....	19
5.5.2	Recording .....	19
5.6	Calibration .....	19
5.6.1	General .....	19
5.6.2	Calibration unit .....	20
6	Commissioning .....	20
6.1	General .....	20
6.2	System checks .....	20
6.3	Measurements during commissioning of the reactor .....	20
7	Performance of monitoring .....	21
7.1	General .....	21
7.2	Prerequisites .....	21
7.3	Measurements .....	22
7.3.1	General .....	22
7.3.2	Reference measurements .....	22
7.3.3	Operational measurements .....	23
7.3.4	Identification .....	23
7.4	Monitoring .....	23
7.4.1	Selecting a comparative measurement .....	23
7.4.2	Determination and evaluation of changes .....	24
7.5	Test of the monitoring system .....	28
7.5.1	General .....	28
7.5.2	Test during fuel outage of the plant .....	29
7.5.3	Test during operation of the reactor .....	29
8	Documentation .....	29
Annex A (informative)	Vibration monitoring, Example 1 .....	31

<b>A.1</b>	<b>General .....</b>	<b>31</b>
<b>A.2</b>	<b>Monitoring of the components of the primary circuit and reactor pressure vessel internals .....</b>	<b>31</b>
<b>A.3</b>	<b>Frequency-selective monitoring of the shaft vibrations of the main coolant pumps .....</b>	<b>33</b>
<b>Annex B (informative) Vibration monitoring, Example 2 .....</b>		<b>43</b>
<b>B.1</b>	<b>Monitoring the components of the primary circuit and reactor pressure vessel internals .</b>	<b>43</b>
<b>B.2</b>	<b>Frequency-selective monitoring of shaft vibrations in the main coolant pumps .....</b>	<b>45</b>
<b>Annex C (informative) Example of signal trends of a fractured shaft .....</b>		<b>56</b>
<b>Bibliography .....</b>		<b>58</b>