

VGB-Standard 506-00-2019-02-EN

Condition Monitoring and Inspection of Components of
Steam Boiler Plants, Pressure Vessel Installations and Water- or
Steam-Pipes in Thermal Power Plants



Contents

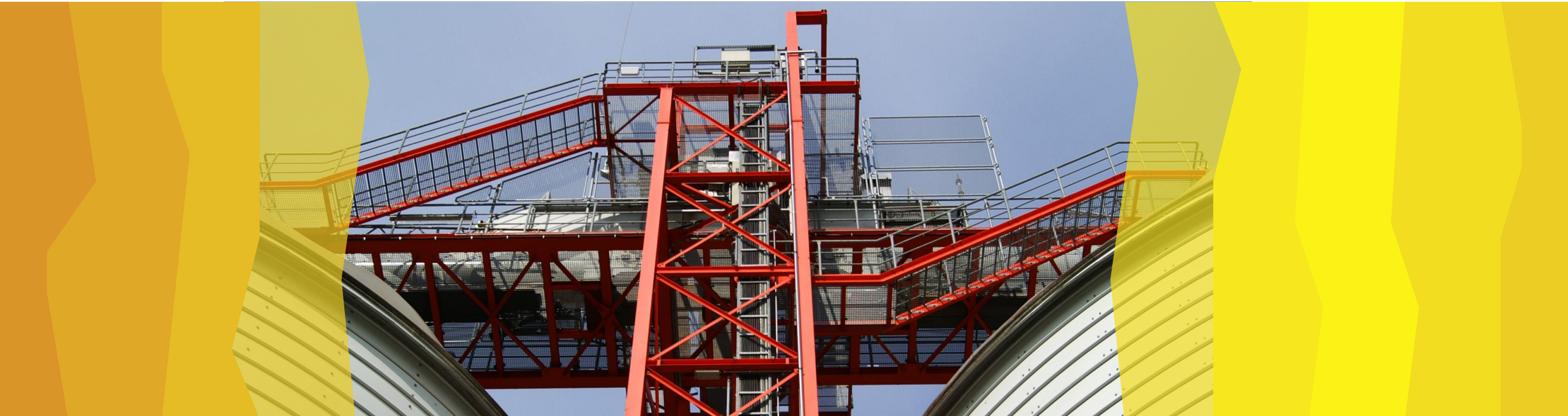
1 General information on the responsible committees

2 Tasks and objectives of VGB-S-506

3 Condition monitoring modules

4 Summary

1 General information on the responsible committees



Technical Competence Center Thermal Power

Steering Forum Thermal Power

vgbe Committees

TC Biomass Ash

TC Chemistry and Emission Control

WG Chemical Engineering and Analytics

TC Civil Structures

WG Construction technology for cooling towers incl. Recalculation

WG Deconstruction

WG Revision R-612

TC Conventional Steam Generation Process

WG Big steam generators (GD)

WG Fuels, firing systems and flue gas cleaning technology

TC Cooling Systems

TC Designation and Documentation

TC Digitalisation

TC Electrical Engineering

WG Technical Experts and Grid Connection

WG Generators and Transformers

WG Research project SSTI

TC Energy from Waste

WG Fluidised bed combustion and thermal sewage sludge treatment

TC Environment and Regulation

WG Emissions and Immissions

WG Emissions Monitoring

TC Gas Turbines

TC Health and Safety

WG Contractor Management

WG Industrial Safety

WG Leading RPIS

WG Occupational Health and Safety

WG Working Materials

TC Industrial Cogeneration

WG Biomass

WG BHKW

TC Instrumentation and Control

WG OT-Security

WG PC KELI 2024

WG Control System Mauell

Technical Competence Center Thermal Power

Steering Forum Thermal Power

vgbe Committees

TC Maintenance Management

- WG Acceptance and Control Tests
- WG Power Generation Maintenance Optimisation Network (PGMON)

TC Materials and QA

- WG Strain Corrosion Cracking
- WG Revision S-517
- WG Martensitic Materials
- WG Pipes and Valves
- WG Construction and assembly supervision / quality assurance
- WG Condition Monitoring and Testing

TC Network Codes

- WG Technical Aspects German Regulation

TC Operational Management

- WG Plant Management Systems

TC Performance Indicators

- WG Definition and Evaluation
- WG Development KISSY
- WG Application

TC Residues and By-products

TC Steam Turbines

- WG USC User Group
- WG Compressors

+ integrated committees with other associations

Number of TC: 21 / Number of WG: 39

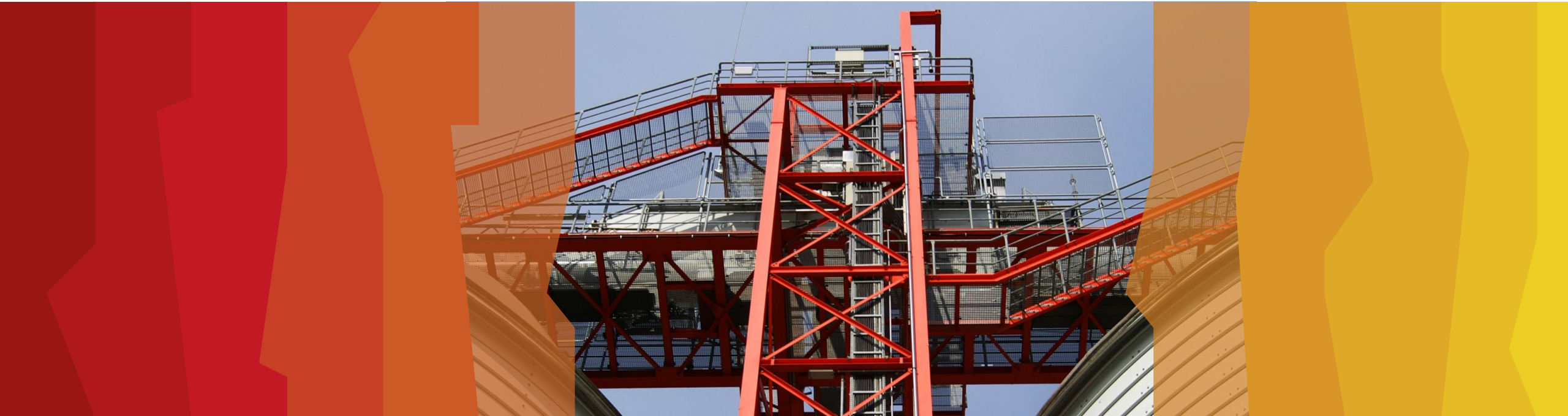
TC „Material and Quality Assurance“

- Material technology exchange of experience and networking
- Implementation of damage analysis
- Assessment of special events
- Assessment of the qualification of new materials
- Initiation and management of working groups and technical programs
- Initiation and assessment of publicly funded research projects (BMWl, BMBF, AVIF, AiF, ...)
- Initiation and assessment of future topics
- Assessment of prepared position papers and technical reports

WG „Condition Monitoring and Testing“


- Consideration of the regulatory process regarding VGB-S-506 and 509
- Procedure for determining highly stressed components
- Lifetime management and condition monitoring
- Evaluation and exchange of experiences/measures in power plants, e. g. damages to boiler circulation pumps; Implementation of VGB/vgbe standards
- Probing of in-Service inspections in connection with plant shutdowns

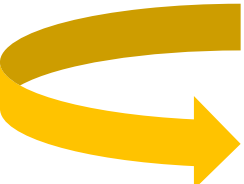
2 Tasks and objectives of VGB-S-506




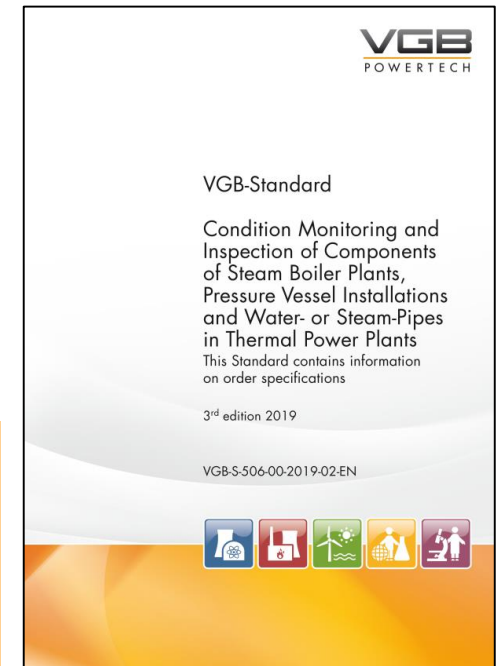
Tasks and objectives of VGB-S-506

- This VGB Standard describes methods for the condition monitoring and inspection of steam boiler plant components, pressure vessel installations and water- and steam pipes, with due respect of possible hazards caused by steam and pressure.
- Depending on pressure, temperature and mode of operation, power plant components are subject to service life consumption

 the condition changes depending on actual operational loadings over the operational life time

 These conditions must be monitored in order to make predictions about the condition of the different components

 **The „Main“** task of this monitoring is to avoid risks for employees and other persons who are present in the danger zone



Tasks and objectives of VGB-S-506

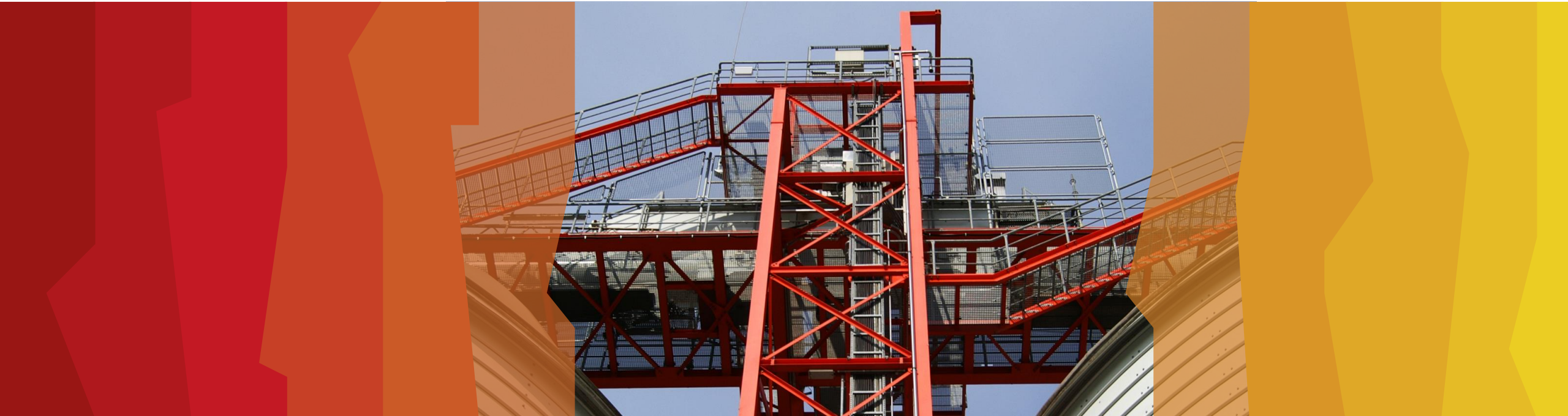
Additional objectives getting from the information of the condition monitoring:

- Extension of the inspection periods
- Specific non-destructive testing
- Better planning for component replacements

2	Table of contents	
1	Preface	3
2	Table of contents	6
3	Introduction	9
3.1	Scope and objectives of this VGB-Standard.....	9
3.2	Definition and objective of condition monitoring	9
4	Condition monitoring modules	10
4.1	Design	10
4.1.1	Special case "Reduction of strength parameters of materials"	11
4.2	Documented quality.....	11
4.2.1	Manufacturing.....	11
4.2.2	Periodic inspections and operations	13
4.2.3	Overhaul.....	13
4.3	Selection of highly loaded components	13
4.4	Condition monitoring during operation.....	14
4.4.1	Creep and fatigue	15
4.4.2	Additional loadings	15
4.4.2.1	Process-related causes	16
4.4.2.2	Component-related causes	16
4.5	Condition monitoring during shutdown	17
4.5.1	Visual inspections.....	17
4.5.2	Materials testing	17
4.5.3	Functional tests	17
4.6	Condition assessment	17
4.6.1	Statistical methods	18
4.6.2	Probabilistic methods	19
4.6.2.1	Risk-based inspection (RBIF), (DIN EN 16991:2018)	19
4.6.2.2	Expert methods (qualitative method).....	21
4.6.3	Periodic lifetime monitoring based on technical rules	22
4.6.4	Fast Fatigue Evaluation (FFE).....	23
4.6.5	Detailed inelastic analysis	24
4.6.6	Fracture-mechanics based method of damage tolerance analysis.....	25
5	Inspections	26
5.1	Specific requirements for the hazard assessment of components	28
5.2	Inspections prior to putting into service or prior to restarting upon	28
	changes liable to inspection made in pressure systems liable to	
	supervision as per § 15 of the Ordinance on Industrial Safety and	
	Health (BetRSichV).....	30
5.2.1	Inspection prior to first putting into service of a pressure system	30
	liable to supervision	30
5.2.1.1	Additional requirements for steam boiler plants.....	33
5.2.1.2	Additional requirements for pressure vessel installations	36
5.2.1.3	Additional requirements for piping	37
5.2.2	Inspections prior to restart upon changes liable to inspection on	38
	pressure systems liable to supervision	38

5.3	Periodic inspections of pressure systems	43
5.3.1	Inspection of good order	43
5.3.2	Technical inspection	44
5.4	Periodic inspection of pressure system components liable to	44
	supervision	44
5.4.1	Inspection of good order	44
5.4.2	External inspection on steam boilers	45
5.4.2.1	Inspection of items of equipment having safety functions and the	46
	related instrumentation and control systems	46
5.4.2.2	Additional inspections of components exposed to creep or cyclic	47
	loading	47
5.4.3	Internal inspection on steam boilers	48
5.4.4	Further measures in case of expected cumulative damage in	51
	the creep range	51
5.4.5	External inspection on pressure vessels and connected pipework.....	53
5.4.6	Internal inspection on pressure vessels and related pipework	55
5.4.7	External inspections of pipes.....	57
5.4.7.1	Preparation of external inspections	57
5.4.7.2	Performance of external inspections	57
5.4.8	Strength test (pressure test) on pressure equipment system	59
	components	59
5.4.8.1	Test gauge pressure during the strength test (pressure test).....	60
5.4.8.2	Application and holding time of test gauge pressure	61
5.4.8.3	Requirements for water	62
5.4.8.4	Visual inspections of walls.....	62
5.5	Inspection concept for the performance of substitute tests and	62
	replacement measures	62
5.5.1	Substitution of hydrostatic pressure tests b non-destructive testing ..	63
5.5.1.1	Substitute test for hydrostatic pressure testing in the case of	63
	reheaters	63
5.5.1.2	Substitute test for hydrostatic pressure testing in the case of	64
	accumulators	64
5.5.2	Partial substitution of internal inspections by an additional	65
	hydrostatic pressure test	65
5.6	Suitable methods for guaranteeing the safety in another way	65
5.6.1	Target/actual comparison for pipework	66
5.6.2	Optimized modelling	66
5.7	Certificates	68
6	Additional references	69
6.1	Literature referenced in the text.....	69
6.2	Supplementary references t	70
7	List of abbreviations	73

3 Condition monitoring modules

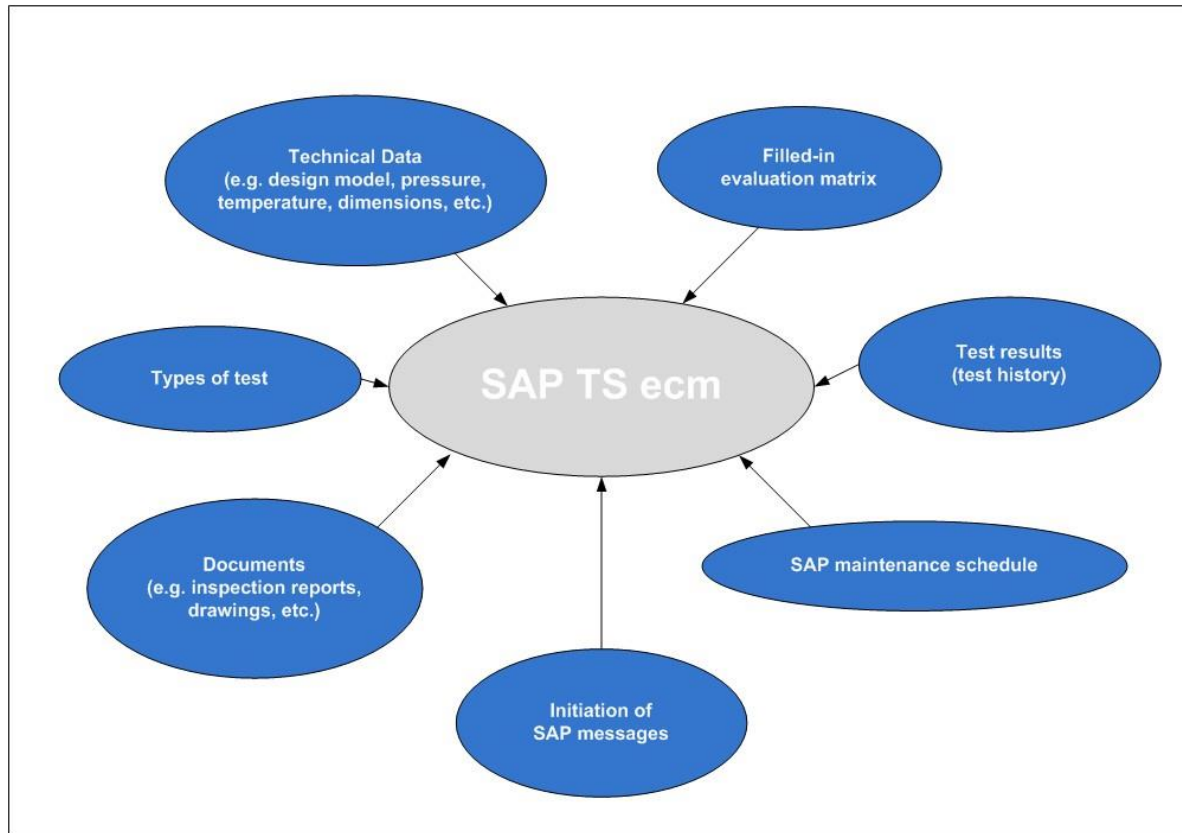


Different Assessments for „Online Monitoring“ listed and described in the standard:

- Statistical methods
- Probabilistic methods
 - Risk-based inspection (RBIF)
 - Expert methods (qualitative method)
- Periodic lifetime monitoring based on technical rules
- Fast Fatigue Evaluation (FFE)
- Detailed inelastic analysis
- Fracture-mechanics based method of damage tolerance analysis

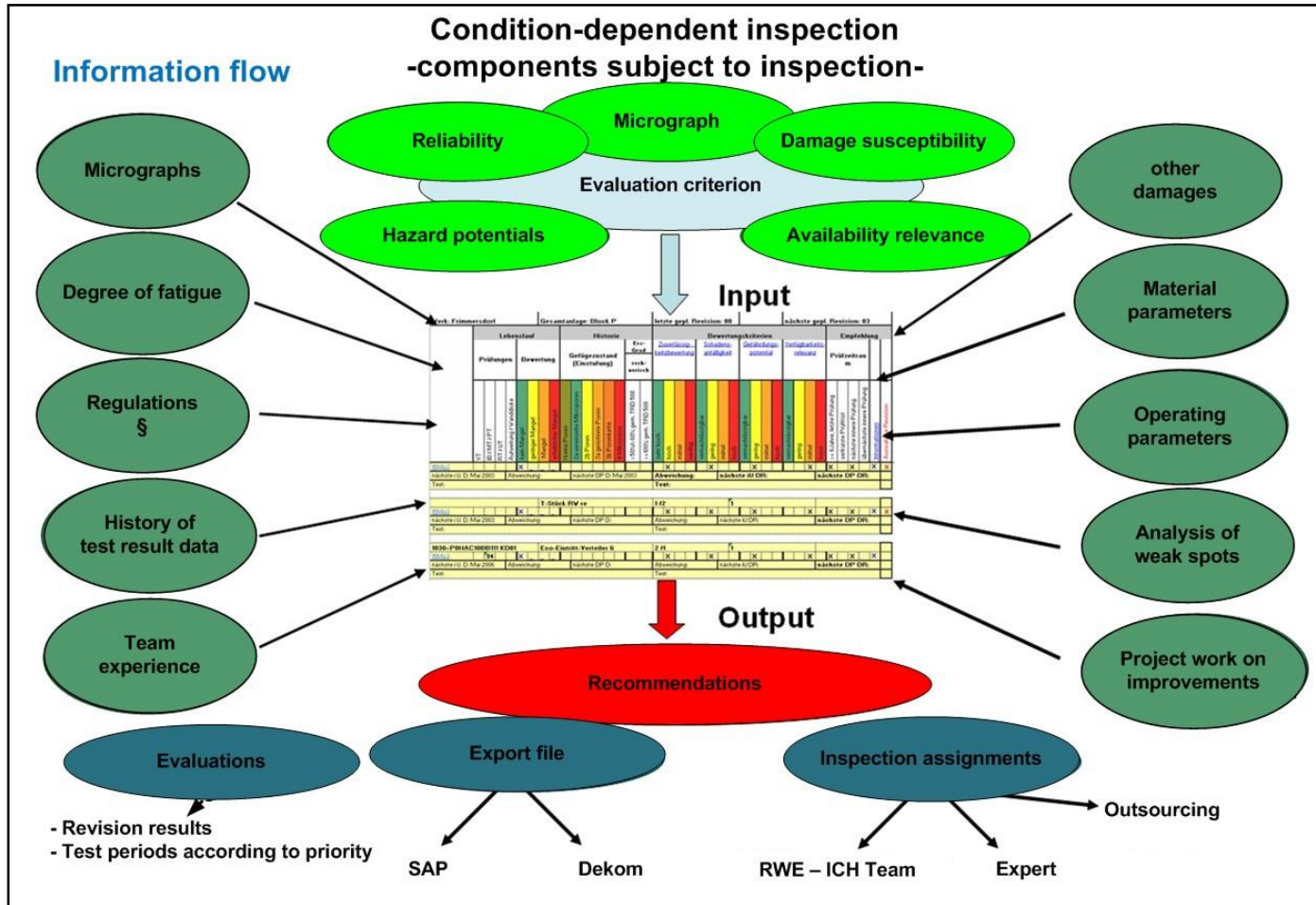
Example for expert-based evaluation procedures

The expert-based evaluation procedure is based on SAP and is titled SAP TS ecm (SAP Technical Supervision equipment condition monitoring).



Target:

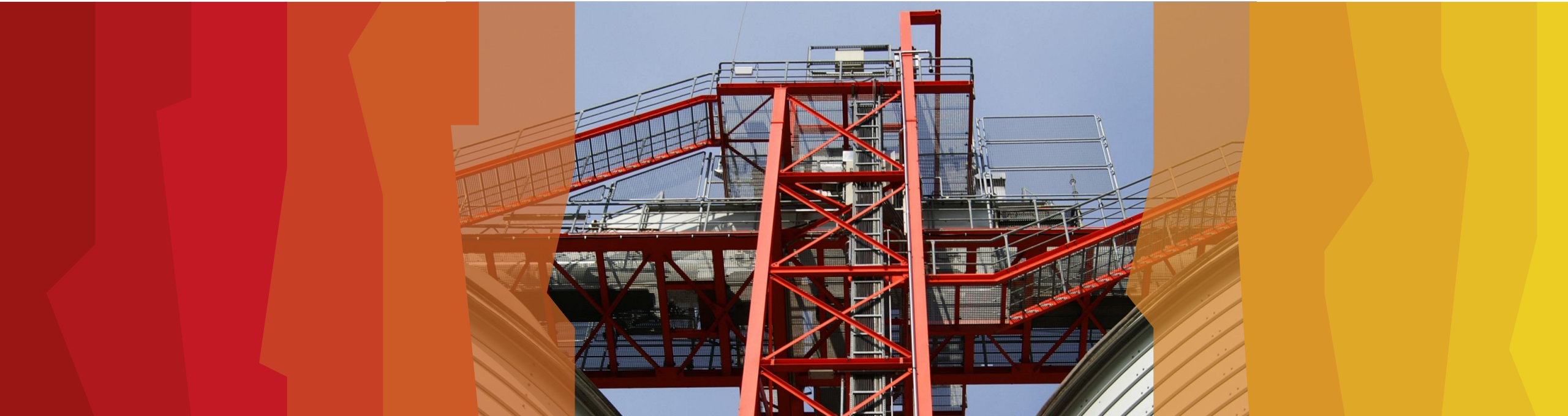
- Modern condition monitoring as an option for the employer to assume his responsibilities and to simultaneously achieve an inspection period extension with the same safety standard.
- Reduction of downtimes by optimisation of maintenance, inspection and repair measures which lead to an increase in plant availability.



Results of the evaluation matrix:

- Traceable updates of the hazard assessment/ safety-related assessments and inspection periods
- Identification of components susceptible to failures
- Transparency of the knowledge of the plant condition
- Optimisation of the extent of inspections with respect to safety and efficiency
- Optimised scheduling of tests and improved integration of upcoming tests into operative shutdown
- Identification of components that have not been checked during the evaluation period

4 Summary



Summary

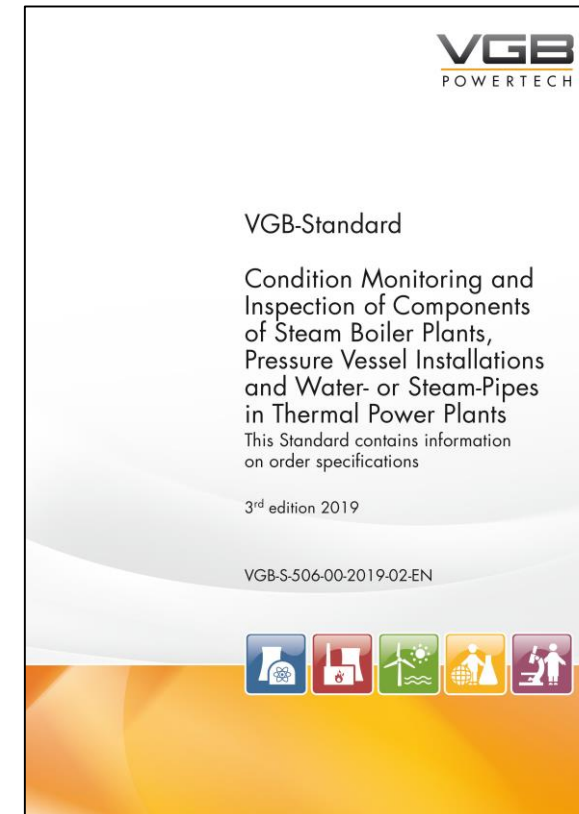
This VGB Standard describes possibilities and methods for condition monitoring and performance of tests and inspections in due consideration of hazards especially arising from steam and pressure in components of steam boiler plants, pressure vessel installations and water- or steam pipework.

Available for Non-vgbe-Member (417,30€):

<https://www.vgb.org/shop/s506e-ebook.html>

Available for vgbe-Member (for free):

<https://pulse.vgbe.energy/read/0d288262-02e7-4d45-9b7c-556f2dff645a/#1>



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