

# FITNESS-FOR-SERVICE ASSESSMENT

## Live Online Training Course: Maintain & Prolong the Life of Your Pressurised Plant & Equipment

This course will help engineers develop a complete method for analysing, evaluating and monitoring the operation, design & maintenance of pressurised equipment.

Learn how to apply the Fitness-For-Service standard API 579-1/ASME FFS-1 2016 through the understanding of material behaviour, non-destructive testing and importance of operating condition.

**March 2021** Course Parts will commence at **09:00** and end at **13:00 (SGT)**. There will be short breaks during each course Part.

Part 1: **22<sup>nd</sup> March**      Part 2: **23<sup>rd</sup> March**      Part 3: **25<sup>th</sup> March**      Part 4: **26<sup>th</sup> March**

**Sep 2021** Course Parts will commence at **09:00** and end at **13:00 (SGT)**. There will be short breaks during each course Part.

Part 1: **20<sup>th</sup> September**      Part 2: **21<sup>st</sup> September**      Part 3: **27<sup>th</sup> September**      Part 4: **28<sup>th</sup> September**

**Dec 2021** Course Parts will commence at **09:00** and end at **13:00 (SGT)**. There will be short breaks during each course Part.

Part 1: **6<sup>th</sup> December**      Part 2: **7<sup>th</sup> December**      Part 3: **13<sup>th</sup> December**      Part 4: **14<sup>th</sup> December**

**4 Part Series**



**Our Expert Course Instructor**



**Annette Karstensen**

Annette is a PhD & Chartered Engineer with more than 23 years experience in structural integrity assessments & the application of API579-1/ASME FFS-1 2016 to assess fitness-for-service in industrial plant.

### Key Learning Objectives

- ▶ Review the sections of API 579-1/ASME FFS-1 2016 used for assessing brittle fracture, crack-like defects, corrosion and creep
- ▶ Understand and apply background information on FFS assessment
- ▶ Analyse, evaluate and monitor pressurised equipment for continued operation
- ▶ Discuss damage mechanisms and the importance of identification
- ▶ Solve example problems on the practical application of the techniques incorporated in API 579-1/ASME FFS-1 2016
- ▶ Understand the relationship between API 579-1/ASME FFS-1 2016 and other FFS standards
- ▶ Appreciate the remaining life assessment, remediation, and methods to extend the life of damaged equipment

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## ABOUT THE COURSE

Fitness-For-Service (FFS) assessment is a multi-disciplinary quantitative engineering approach to determine whether equipment is suitable for continued operation.

The pressurised structure or component of interest may contain flaws or other damage, or may be subjected to more severe operating conditions than anticipated by the original design.

The outcome of a FFS assessment is a decision to run the component as is, alter it, repair it, or replace it. A remaining life assessment may be performed as part of a FFS evaluation in order to determine how long the asset can be operated safely or to define appropriate inspection intervals.

This course provides training on the application of API 579-1/ASME FFS-1, a standard jointly published by the American Petroleum Institute (API) and the American Society for Mechanical Engineers (ASME).

Example problems will be worked through to provide participants with a detailed understanding of the various FFS calculations.

## WHO WILL BENEFIT

This is a technical course. It will benefit engineers and engineering management engaged in the operation, design, analysis, and maintenance of pressurised plant or equipment in industry. Job titles include: plant, mechanical, civil, structural, reliability and project engineers. Metallurgists and maintenance employees who design or operate pressurised plant or equipment that may develop cracks in service or at the time of manufacture will also benefit.

## Learn Anywhere, Learn Anytime

### Catering to meet all your learning needs:

- Get **high quality** practical training from our expert instructors
- From **Face To Face**, **Online** and **Blended Learning**, get a superior solution for your learning needs
- Learn **live online** in an interactive environment
- **Invest** in yourself. Invest in your team.

Register today for our **Live Online Training** courses and find out how they can help you transform the way you work. Contact one of our training consultants on [sgtraining@informa.com](mailto:sgtraining@informa.com) to find out more.

## EXPERT COURSE INSTRUCTOR



### Annette Karstensen

Annette is a Chartered Engineer and a fracture mechanics expert with more than 20 years' experience in structural integrity assessments and the application of API579-1/ASME FFS-1 to assess Fitness-For-Service in industrial plants.

These assessments cover engineering components related to power, petrochemical and other engineering plants.

Her main line of work involves the application of assessment procedures to calculate maximum tolerable flaw sizes and/or time-to-failure under cyclic load or high temperature exposure. Assessments are also typically carried out in connection with fitness-for-service investigations involving corrosion, fracture, creep and/or fatigue.

Annette has an in-depth knowledge of assessments, particularly related to welds, using BS7910 "Guide on methods for assessing the acceptability of flaws in metallic structures". Annette is also familiar with other assessment procedures such as API579, R5/R6 and with pressure vessel design codes (PD5500 and ASME). Annette is extensively involved in making recommendations for mechanical testing programmes such as fracture toughness testing and measurement of welding residual stresses.

Annette has extensive experience in finite element stress analysis (FEA) and has analysed a large range of both linear and non-linear components (plasticity, thermal and contact). FEA in structural integrity is typically carried out to determine stress intensity factor solutions and/or applied stresses for input into the engineering critical assessment. She has also extensive experience in performing corrosion assessments using FEA and has published several papers on the subject.

A recent selection of major projects Annette has been involved in includes:

- Life assessments considering creep and fatigue crack growth in power plant components
- Fitness-For-Service assessments of pressure vessels in petrochemical plants
- Structural integrity assessments of cyclic loaded components in low cycle fatigue
- Integrity assessments of penstock in a hydro power plant
- Examination of cracking in a generator rotor from hydro-electrical power plants

## WHAT OUR CLIENTS SAY

*"Broad and in-depth knowledge of subject and use of relevant examples."*

Senior Mechanical Engineer, **Newcrest Mining**

*"Her experience in the field of study and ability to reference actual examples and studies."*

Lead Mechanical Engineer, **QGC**

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## Course Outline

This course examines step by step and in detail the contents of the API/ASME standard. The sessions are not necessarily equal in length. The main focus will be on some of the more commonly used sections in API579.

The level of detail examined will be dependent of the requirements and experience of the participants.

Most case studies examined throughout the course will be pre-worked to improve productivity and maximise learning transfer through group discussion. However, there will be opportunities for participants to work through a number of limited problems individually and in group work.

Participants are encouraged to bring specific problems of interest to them to discuss during the course, to assist with problem solving and benchmarking against best practices and lessons learnt.

### Assessment of brittle fracture

- Levels 1 and 2
- Case study examination
- Participant questions/problems/discussion

### Assessment of general metal loss

- Level 1, 2, and 3 assessment
- Case study examination
- Participant questions/problems/discussion

### Assessment of local metal loss

- Level 1, 2, and 3 assessment
- Case study examination
- Participant questions/problems/discussion

### Assessment of pitting corrosion

- Level 1, 2, and 3 assessment
- Case study examination
- Participant questions/problems/discussion

### Assessment of crack-like flaws

- Level 1, 2, and 3 assessment
- Case study examination
- Participant questions/problems/group discussion

### Assessment of creep damage

- Level 1, 2, and 3 assessment
- Case study examination
- Participant questions/problems/group discussion



## Would You Like To Run This Course On-Site?

### Informa Corporate Learning: On-site & Customised Training

If you have **8+** interested people, an onsite course can be an ideal solution. Speak with **Anton Long** or **Holly Baldwin** on **+65 6973 3567** to discuss your customised learning solution, or email [sgtraining@informa.com](mailto:sgtraining@informa.com)

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## 4 Easy Ways to Register

- 1 Telephone**  
Customer Service Hotline +65 6973 3567
- 2 Email**  
sgtraining@informa.com
- 3 Fax**  
+65 6508 2407
- 4 Web**  
www.informaconnect.com.sg/fitnessforservice

## Fitness-for-Service Assessment

Course Code	Location	Course Parts	Month	Standard Price	4+ Dels Discount
P21GE07SGV	Live Online Training	All 4 Parts	March 21	SGD \$2,076	<b>Great Savings:</b> When you book <b>4 or more</b> participants! <b>Call us</b> today on <b>+65 6973 3567</b> or email <b>sgtraining@informa.com</b> to take advantage of the discount offer.
P21GE07SG02V	Live Online Training	All 4 Parts	September 21	SGD \$2,076	
P21GE07SG03V	Live Online Training	All 4 Parts	December 21	SGD \$2,076	

A 7% Goods & Services Tax (GST) is applicable to all Singapore based companies.

<b>Delegate 1 Details</b> Name: Dr/Mr/Ms _____ Job Title: _____ Department _____ Tel: _____ Mobile No.: _____ Email: _____ <b>Delegate 3 Details</b> Name: Dr/Mr/Ms _____ Job Title: _____ Department _____ Tel: _____ Mobile No.: _____ Email: _____ Who is Head of your Department? _____ <b>Company Information</b> Company Name: _____   Main Business/Activity: _____ Address: _____   Postal Code: _____	<b>Delegate 2 Details</b> Name: Dr/Mr/Ms _____ Job Title: _____ Department _____ Tel: _____ Mobile No.: _____ Email: _____ <b>Delegate 4 Details</b> Name: Dr/Mr/Ms _____ Job Title: _____ Department _____ Tel: _____ Mobile No.: _____ Email: _____ Who is Head of Training? _____
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Please photocopy for additional delegates

### Payment Method (Please tick):

- I enclose my bankers draft / cheque payable to IBC Asia (S) Pte Ltd
- I am paying by bank transfer (copy attached)
- Payment by Credit Card. (AMEX, VISA or MasterCard accepted)

### CREDIT CARD PAYMENTS

The best way to pay by credit card is through our secure on-line registration process, simply log on to the website at [www.informaconnect.com.sg/fitnessforservice](http://www.informaconnect.com.sg/fitnessforservice) and click "Register On-line". If you would prefer to pay over the phone please complete the contact name and details and our Customer Services Team will call within 24 hours to take payment. As we treat your credit card information in the strictest confidence, please do not send payment details by email.

Credit card contact: \_\_\_\_\_ Department: \_\_\_\_\_  
 Direct phone number: \_\_\_\_\_ Email: \_\_\_\_\_

### PAYMENT TERMS

Payment must be received 10 business days prior to the event. To take advantage of discounts with an expiry date, registration and payment must be received by the cut-off date.

- Payment by bankers draft or cheque in S\$ or US\$ should be made in favour of 'IBC Asia (S) Pte Ltd' and mailed to:  
IBC Asia (S) Pte Ltd  
c/o Informa Regional Business Services  
103 Penang Road, Visioncrest Commercial #04-01, Singapore 238467  
**Attn: The Accounts Receivable Team**
- Payment by bank transfer in S\$ or US\$ made payable to:  
**IBC Asia (S) Pte Ltd**  
A/C No.:147-059513-001 (S\$)  
A/C No.:260-457866-178 (US\$)  
The Hongkong and Shanghai Banking Corporation Limited 21 Collyer Quay, HSBC Building  
Singapore 049320  
**Bank Swift Code: HSBCSGSG**  
**Bank Code: 7232**
- Payment by Credit Card (AMEX, VISA or MasterCard). The best way to pay by credit card is through our secure portal built into the website. To pay by phone please indicate the contact name and details below and our Customer Services Team will call within 24 hours to take payment. Please do not send credit card information by email.

### CANCELLATIONS / SUBSTITUTION

Should you be unable to attend, a substitute delegate is welcome at no extra charge. Cancellations must be received in writing at least 10 business days before the start of the event, to receive a refund less 10% processing fee per registration. The company regrets that no refund will be made available for cancellation notifications received less than 10 business days before the event.

### IMPORTANT NOTE

Please quote the name of the delegate, event title and invoice number on the advice when remitting payment. Bank charges are to be deducted from participating organisations own accounts. Please fax your payment details (copy of remittance advice, cheque or draft to +65 6508 2407).

Attendance will only be permitted upon receipt of full payment. Participants wishing to register at the door are responsible to ensure all details are as published. Informa Connect Singapore assumes no further liability or obligation, beyond the refund of the paid registration fee, in the event of postponement or cancellation by Informa Connect Singapore.

### DATA PROTECTION

The personal information entered during your registration/order or provided by you will be held on database and may be shared with companies in the Informa Group in the UK and internationally. Occasionally, your details may be obtained from or shared with external companies who wish to communicate with you offers related to your business activities. If you do not wish your details to be used for this purpose please contact our Database Department at Email: [database.sg@informa.com](mailto:database.sg@informa.com), Tel: +65 6508 2400 or Fax: +65 6508 2408.