Technical Definition

Low Cycle Fatigue Test – Inconel 718

You shall respect the HSE policy of your laboratory for each performed test.

Please read these instructions carefully BEFORE starting the tests.

1. Five blanks (Ø 25 x 130 mm) are supplied to each participant – 5 results must be provided.
   If one result is missing your test will be considered as an outlier. A RCA shall be completed.

2. The participants are free to choose the specimen geometry. The used size and shape has to be reported.

   The tests shall be performed respecting the following conditions:

   - One operator only
   - One testing machine only
   - Tests performed in sequence

3. The tests are to be performed in accordance with the **ASTM E606-12** and the below requirements and test conditions:

Test specification	**ASTM E606-12**
Temperature (°C)	**550**
Ratio	0
Strain control	
Wave form	Triangular
Frequency (Hz)	0,5
Mean strain	**0.35%**
Strain amplitude	**0.35%**
Load control	
Switch to stress control	15 000 cycles
Condition for mode switch is: plastic strain range < 0.01%	
Use the stress levels which are reached in stabilized strain controlled mode	
Wave form	Sinusoidal
Frequency	5 Hz
N stop (cycles)	Until failure

4. Each participant is required to report the below parameters :

Characteristic	**Unit**	**Significant digits**	**Mandatory / Not mandatory**	**Evaluated** Yes/no
Diameter	mm	X,XX	Mandatory	No
Gage length	mm	XX,XX	Mandatory	No
Max imposed strain	%	X,X	Mandatory	No
Alternate imposed strain	%	X,XX	Mandatory	No
Frequency	Hz	X,XXX	Mandatory	No
Strain rate	%/sec	X,X	Mandatory	No
Modulus before starting the test	MPa	XXXXXX	Mandatory	No
First cycle				
Modulus E2	MPa	XXXXXX	Mandatory	**Yes**
Modulus E1	MPa	XXXXXX	Mandatory	**Yes**
Max stress	MPa	XXXX,X	Mandatory	**Yes**
Min stress	MPa	XXX,X	Mandatory	**Yes**
Stress range	MPa	XXXX,X	Mandatory	**Yes**
Total strain range	%	X,XXX	Mandatory	No
Plastic strain range	%	X,XXX	Mandatory	No
Elastic strain range	%	X,XXX	Mandatory	No
Mid life				
Number of cycles	cycles	XXXXX	Mandatory	No
Modulus E2	MPa	XXXXXX	Mandatory	**Yes**
Modulus E1	MPa	XXXXXX	Mandatory	**Yes**
Max stress	MPa	XXXX,X	Mandatory	**Yes**
Min stress	MPa	XXX,X	Mandatory	**Yes**
Stress range	MPa	XXXX,X	Mandatory	**Yes**
Total strain range	%	X,XXX	Mandatory	No
Plastic strain range	%	X,XXX	Mandatory	No
Elastic strain range	%	X,XXX	Mandatory	No
Cycles to crack initiation NA (5% load drop of stabilized upper stress level)	cycles	XXXXX	Mandatory	No
Cycles NR 75%	cycles	XXXXX	Mandatory	No
Cycles NF	cycles	XXXXX	Mandatory	**Yes**
Failure location	N/A	N/A	Mandatory	No

NF will be analysed according to algorithm A (ISO 13528-2015) - based on the logarithm of the number of cycles – and evaluated using z-score.
All other evaluated characteristics will be analysed according to the algorithm A and S (ISO 13528 – 2015) and evaluated using z-score.

5. Testing shall start **as soon as test specimens are received**. Please contact the following e-mail address for any technical or administrative query.

Submission date :	**July 1st, 2020**
Technical and administrative support :	info@ptpscheme.com

6. Instructions for submission of results are detailed on the website:

https://ptpscheme.com

7. To ensure the confidential treatment of your results in the final report, you will be allocated a unique identity number when you register for the program.

8. Collusion and falsification of your PTP results are totally forbidden. In case of identification or suspicion of collusion or falsification, the laboratory will be excluded from the program and the sponsors will be immediately informed. The sponsors could ask you proofs of your records and analyses, so be sure to conserve data, curves and specimens.

9. The tested specimens do not need to be sent back to the PTP office.

APPENDIX: Instructions for IRR participation

The Internal Round Robin participation (IRR) is **optional** and **independent** from your PTP participation.
Confidentiality: The IRR results and reports are confidential and only accessible by your laboratory. They are not shared with the scheme sponsors or any other accreditation or certification bodies.

The extra samples shall be tested according to the following table:

	Operator 1	**Operator 2**	**Operator 3**	**Operator 4**	**Operator X**
Test machine 1	PTP kit (5 samples)	3 samples	3 samples	3 samples	3 samples
Test machine 2	3 samples				
Test machine 3	3 samples				
Test machine Y	3 samples				

Operator 1 (OP1) is to be the most experienced operator currently conducting tests on a regular basis and shall perform tests on all machines (TM1, TM2, TM3…)
Test Machine 1 (TM 1) is to be the most utilised machine for this test in your laboratory and shall be tested by all operators (OP1, OP2, OP3…)

Example: A laboratory has 2 operators and 3 test machines. They receive a PTP kit and 9 extra specimens.
Operator 1 shall test the PTP kit on TM1, 3 specimens on TM2 and 3 specimens on TM3.
Operator 2 shall test 3 specimens on TM1.

The IRR results have to be submitted on a separate results form available on the PTP website.
The identification of operators and test machines you provide will appear on the IRR final report. These identifications will not be seen by other laboratories.

The IRR results will be classified against the acceptance classes of the kit 9-1-2020.

Reminder: Laboratories are not permitted to switch specimens between the PTP kit and IRR samples. The traceability of the samples will be checked during the evaluation. Laboratories found to have switched samples will invalidate their PTP participation.

REVISION HISTORY

Issue Date	Issue N°	Changes
06/01/2020	1	Document creation
20/03/2020	2	Modification of the results submission date
28/05/2020	3	Modification of the results submission date