

Revision No. 3	Page 1 of 4	<div>Technical Definition</div> <div>Low Cycle Fatigue Test – Inconel 718</div>
<div>ptp.</div>		
<div>Kit 9-1-2023</div>		

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 E606-21, EN 6072 (2010)** and the below requirements and test conditions:

Test specification	ASTM E606-21 / EN 6072 (2010)
Temperature (°C)	550°C
Ratio	0
Strain control	
Wave form	Triangular
Frequency (Hz)	0.5
Mean strain	0.30%
Strain amplitude	0.30%
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

Revision No. 3	Page 2 of 4	<div>Technical Definition</div> <div>Low Cycle Fatigue Test – Inconel 718</div>
<div>ptp.</div>		
<div>Kit 9-1-2023</div>		

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

<u>General information</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
Specimen ID	-	PTP-XXX-XXX	Mandatory	No
Test Date	-	XX/XX/XXXX	Mandatory	No
Diameter at R.T.	mm	X,XX	Mandatory	No

<u>Before starting the test</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
E at R.T.	MPa	XXX XXX	Mandatory	No
E at E.T.	MPa	XXX XXX	Mandatory	No

<u>Cycle at specified strain</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
number of cycle	Cycles	XX	Mandatory	No
E _{loading} at test temperature	MPa	XXXXXXX	Mandatory	No
E _{unloading} at test temperature	MPa	XXXXXXX	Mandatory	No
σ_{\max} (max stress)	MPa	XXX	Mandatory	No
σ_{\min} (min stress)	MPa	XXX	Mandatory	No
$\Delta\sigma$ (stress range)	MPa	XXX	Mandatory	No
ϵ_{\max} (max strain)	%	X,XX	Mandatory	No
ϵ_{\min} (min strain)	%	X,XX	Mandatory	No
$\Delta\epsilon_{\text{total}}$ (calculated total strain range)	%	X,XXX	Mandatory	No
$\Delta\epsilon_{\text{plastic}}$ (calculated plastic strain range)	%	X,XXX	Mandatory	No
$\Delta\epsilon_{\text{elastic}}$ (calculated elastic strain range)	%	X,XXX	Mandatory	No

<u>Half life</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
number of cycle	Cycles	XXXXXXX	Mandatory	No
E _{loading} at test temperature	MPa	XXXXXXX	Mandatory	No
E _{unloading} at test temperature	MPa	XXXXXXX	Mandatory	No
σ_{\max} (max stress)	MPa	XXX	Mandatory	No
σ_{\min} (min stress)	MPa	XXX	Mandatory	No
$\Delta\sigma$ (stress range)	MPa	XXX	Mandatory	No
ϵ_{\max} (max strain)	%	X,XX	Mandatory	No
ϵ_{\min} (min strain)	%	X,XX	Mandatory	No
$\Delta\epsilon_{\text{total}}$ (calculated total strain range)	%	X,XXX	Mandatory	No
$\Delta\epsilon_{\text{plastic}}$ (calculated plastic strain range)	%	X,XXX	Mandatory	No
$\Delta\epsilon_{\text{elastic}}$ (calculated elastic strain range)	%	X,XXX	Mandatory	No

Revision No. 3	Page 3 of 4	<div>Technical Definition</div> <div>Low Cycle Fatigue Test – Inconel 718</div>
<div>ptp.</div>		
<div>Kit 9-1-2023</div>		

<u>Information on switching and at the end of test</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
Number of cycle at switching to load control	Cycles	XXXXXX	Mandatory	No
σ_{\max} (max stress)	MPa	XXX	Mandatory	No
σ_{\min} (min stress)	MPa	XXX	Mandatory	No
Cycle number at N_R (75% of stress at midlife or fracture)	Cycles	XXXXXX	Mandatory	No
Cycle number at the end of the test	Cycles	XXXXXX	Mandatory	Yes
Static rupture in tension: "Yes" or "No"	-	Yes / No	Mandatory	No

<u>Visual observation of rupture faces</u>	Unit	Significant digits	Mandatory / Not mandatory	Evaluated
Location of the fracture	-	IT\S	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. Definitions

- **Cycle at specified strain** : First cycle at specified strain minus corresponding tolerance value.
- **Cycle number at NR** : Number of cycles when the maximum stress drops to 75 percent of its stabilized value
- **E loading** : is the loading modulus
- **E Unloading** : is the unloading modulus

6. 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 :	August 15th, 2023
Technical and administrative support :	info@ptpscheme.com

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

<https://ptpscheme.com>

8. 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.
9. 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.
10. The tested specimens do not need to be sent back to the PTP office.

Revision No. 3	Page 4 of 4	<div>Technical Definition</div> <div>Low Cycle Fatigue Test – Inconel 718</div>
<div>ptp.</div>		
<div>Kit 9-1-2023</div>		

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 9-1-2023

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
10/05/2023	1	Document creation
25/05/2023	2	Correction of Mean stain and strain amplitude, modification of evaluated characteristics
17/07/2023	3	Submission date update