



*Division Materials and Process*

**Haynes International**

1020 West Park Avenue

46904 - KOKOMO

U.S.A.

**O/Ref. :** AQPS 73\_20170803

**Phone :** (33) 69 87 05 53

**Réau, the** August 3, 2017

**To :**

**Attention to Mr Daniel HUNT**

**Manager – Research & Technology Laboratories**

*Your correspondent : M. Michel BIDEAU*

*michel.bideau@safrangroup.com*

**Subject : Qualification renewal – AQPS 73**

Dear Sir,

Please find attached the Corrective Action Request CAR n° 200009341 closed, the Special Processes Qualification Report and the final AQPS n° 73.

Consequently, we are pleased to inform you that the renewal of your qualification is pronounced according to GRP-0087 and GRM-0123 procedures. We take advantage of this renewal to inform you of our new process of qualification and monitoring (see attached letter).

Continuance of the laboratory qualification depends on conditions outlined in the SAFRAN procedures GRP-0087 and GRM-0123.

Yours faithfully.

The auditor

Michel BIDEAU

Laboratory Special Processes  
Qualification Manager

Pi Thomas LANEYRIE

Antoine ROSSIGNOL

**Enclosed :** AQPS n° 73  
CRQPS 73\_20170803 Ind. 1  
CAR n° 200009431 closed

# Attestation de Qualification des Procédés Spéciaux Laboratoires

N°AQPS : 73

IND : 0

MDM : 503309

## Laboratory Special Processes Qualification Certificate

Safran Aircraft  
Engines

prononce la qualification sur les référentiels indiqués  
pour l'ensemble des sociétés du Groupe Safran suivant GRP-0087 – GRM-0123.  
grants the qualification on the specifications indicated  
for all companies of Safran Group following GRP-0087 – GRM-0123

**Haynes International**  
**1020 West Park Avenue**  
**46904 - KOKOMO**  
**U.S.A.**

Safran Process N°	Code Lab N°	Procédés Processes	Référentiel Technique Technical Specification	Statut Status	Restrictions techniques Technical limitation	Fin de Validité Expiration Date
<b>8.02 - Mécanique / Mechanic</b>						
8.02.00.01	A	Métaux - Traction à température ambiante / Metals - Tensile test at room temperature	ASTM E8	Qualification (*)	On sheet (nickel and cobalt alloys)	NOT LIMITED
8.02.00.02	B	Métaux - Traction à température élevée / Metals - Tensile test at elevated temperature	ASTM E8, ASTM E21	Qualification (*)		NOT LIMITED
<b>8.03 - Microscopie, Macroscopie / Microscopy</b>						
8.03.00.01	L1a	Métaux - Taille de grains / Metals - Grain size	ASTM E112, E930, E1181	Qualification (*)		NOT LIMITED
8.03.00.99	L1e	Métaux - Autres examens Micrographie optique / Metals - Optical micrography examination: Other	ASTM E3, ASTM E407	Qualification (*)	Laser cut inspection	NOT LIMITED
<b>8.05 - Exposition environnementale / Environmental exposure</b>						
8.05.00.03	R	Métaux - Oxydation / Metals - Oxidation	Internal procedures	Qualification (*)	816-108 816-109 816-110	NOT LIMITED



N° de rapport : CRQPS 73\_20170803 Ind. 1  
Report n°

**Observations :**

Ind. O. 20170803 : Qualification renewal after the Corrective Action Request closed, based on the Dq-6999

(\*) La validité des qualifications des fournisseurs est confirmée et actualisée par la publication de la liste des procédés spéciaux qualifiés sur le site (AIRCOLLAB : [www.boostaerospace.com/aircollab/](http://www.boostaerospace.com/aircollab/)). L'activation des accès fournisseurs à ce site se fait par demande à l'adresse suivante : [saf.admin-gps@safran.fr](mailto:saf.admin-gps@safran.fr). The supplier qualification validity is confirmed and updated by the publication of qualified special process list on website (AIRCOLLAB: [www.boostaerospace.com/aircollab/](http://www.boostaerospace.com/aircollab/)). The activations of suppliers access to the website will be done upon request to this following email address: [saf.admin-gps@safran.fr](mailto:saf.admin-gps@safran.fr).

### Auditeur / Responsable de la qualification Auditor / Qualification leader

	Date	Nom Name	Signature
Auditor Safran Group	August 3, 2017	Michel BIDEAU	
Laboratory Special Processes Qualification Manager	August 3, 2017	Antoine ROSSIGNOL Pi Thomas LANEYRIE	

Dear Sir,

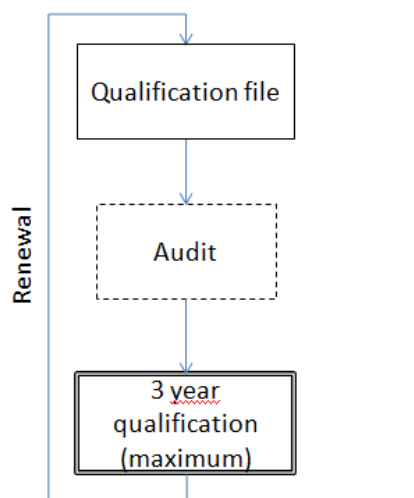
From **01/07/2016** and in accordance with **GRM-0123 Ed1 Rev0 qualification and monitoring process for Safran special processes suppliers evolves**.

From that date, when renewing or initiating your qualifications, you will receive from concerned Safran companies, a qualification certificate **without expiry date**. To maintain your qualification, **Safran monitoring actions** (GRM-0123 §13.6.4) will be performed by Safran auditors. These actions will be determined based your **Nadcap audit results and your performance on Safran parts**. Our auditors **will contact you** for their implementation.

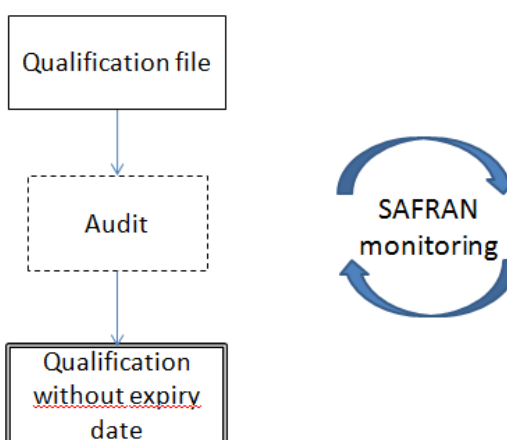
The **suppliers approved qualification list** is available and updated on the web site **AIRCOLLAB**.  
<http://www.boostaerospace.com/aircollab/>

If you do not have any AirCollab account, if you face difficulties with the website or for any question related to this new process, please contact: **saf.admin-gps@safran.fr**

## GRM-0123 §13 before 01/07/2016



## GRM-0123 §13 after 01/07/2016



<b>Nom du Fournisseur</b> <i>Supplier</i>	Haynes International	<b>Code fournisseur</b> <i>Supplier number</i>	MDM 503309		
<b>Adresse</b> <i>Address</i>	1020 West Park Avenue - 46904 Kokomo - USA				
<b>Activité Fournisseur</b> <i>Supplier Activities</i>	Test laboratory.				
<b>Contact fournisseur</b> <i>Supplier contact</i>	<b>Nom</b> : Daniel HUNT <i>Name</i>		<b>Fonction</b> : Manager- Technical Labs <i>Title</i>		
	<b>Adresse email</b> : dhunt@haynesintl.com <i>Email address</i>				
<b>Nature Audit</b> <i>Audit Purpose</i>	<b>Sur site</b> <i>On-site audit</i>	<input type="checkbox"/>	<b>Sur Dossier(DQ)</b> <i>On DQ</i>	<input checked="" type="checkbox"/>	<b>Date</b> :
	<b>Evaluation</b> <i>Evaluation</i>	<input type="checkbox"/>	<b>Renouvellement</b> <i>Re-Approval</i>	<input checked="" type="checkbox"/>	<b>Qualification initiale</b> <i>Approval</i>
					<b>Erreur ! Source du renvoi introuvable.</b>
	<b>Qualification initiale</b> <input type="checkbox"/> <b>Surveillance</b> <input type="checkbox"/> <b>Autre*</b> <input type="checkbox"/> <i>Folow up</i> <i>Other</i>				
	<b>*Si Autre, préciser :</b> <i>If other, detail :</i>				
<b>Thème Audit</b> <i>Scope of Audit</i>	<b>File audit for the renewal of the AQPS n° 73</b>				

Equipe audit & audités <i>Audit staff &amp; auditees</i>				
Fonction <i>Title</i>	Nom <i>Name</i>	Safran	Fournisseur <i>Supplier</i>	Catégorie de l'auditeur Safran <sup>(1)</sup> <i>Safran auditor level</i>
Laboratory quality manager	Larry YAROSZ		Haynes	
Laboratory technical manager	David FLUCK		Haynes	
Business Unit Manager	Eric CHABAULT		B.V.L	Society BVL
Auditor	Vincent TRECU		B.V.L	Society BVL
Auditor	Michel BIDEAU	Safran		Auditor Safran Group


(1) Support Nadcap, Safran, société, en formation / Nadcap support, Safran, society, in progress

Spécification(s) de l'audit <i>Audit Specification</i>					
Référentiels techniques Safran <i>Safran Technical Specification</i>		Audit regarding Snecma standards: GRP-0087, GRM-0123 et ISO 17025:2005.			
Procédés et n°PS <i>Process and PS n°</i>	Identification des installations <i>Facility identification</i>	Référentiel Technique <i>Technical specifications</i>	Accréditation NADCAP <sup>(2)</sup> <i>Nadcap accreditation</i>	Décision <sup>(3)</sup>	Si restrictions ou surveillance référence du paragraphe
8.02.00.01 A	Métaux - Traction à température ambiante / Metals - Tensile test at room temperature	ASTM E8	A	Qualification	On sheet (nickel and cobalt alloys)
8.02.00.02 B	Métaux - Traction à température élevée / Metals - Tensile test at elevated temperature	ASTM E8, ASTM E21	A	Qualification	
8.03.00.01 L1a	Métaux - Taille de grains / Metals - Grain size	ASTM E112, E930, E1181	A	Qualification	
8.03.00.99 L1e	Métaux - Autres examens Micrographie optique / Metals - Optical micrography examination: Other	ASTM E3, ASTM E407	A	Qualification	Laser cut inspection
8.05.00.03 R	Métaux - Oxydation / Metals - Oxidation	Internal procedures	A	Qualification	816-108 816-109 816-110

(2) : A=Accrédité, E=Engagé, F=audit nadcap failure, R=Engagement nadcap refusé / A=Accredited, E=Engaged, F= nadcap audit failed R=Commitment refused

(3) : Qualifié, Refusé, Suspendu, Qualifié provisoirement, Qualifié avec restriction(s), Autorisé avec surveillance / Qualified, Failed, temporary qualified, qualification with technical restriction(s), authorized with enhanced monitoring

Bilan des écarts et recommandations			
<b>Critique(s)</b> : 0 <i>Critical</i>	<b>Majeur(s)</b> : 0 <i>Major</i>	<b>Mineur(s)</b> : 1 <i>Minor</i>	<b>Préventive (s)</b> : 1 <i>Preventative</i>

<b>Produits étudiés pendant l'audit</b> <i>Product aim of the audit</i>					
No specific product has been studied during this laboratory file audit, only tests codes have been audited. The laboratory quotes several parts (See section 1.4.1 of the DQ questionnaire).					
<b>Fournisseur</b> <i>Supplier</i>			<b>Représentant Safran</b> <i>Safran representative</i>		
Date :	Nom :	Visa :	Date :	Nom :	Visa :
			August 3, 2017	Michel BIDEAU	

<b>Points Forts</b> <i>Positive points</i>	<b>Points Faibles</b> <i>Weak points</i>
<p>The facility is Nadcap MTL accredited (Until 31<sup>st</sup> January 2018) and ISO 9001, AS9100C certified.</p> <p>The laboratory is also Airbus, GE supplier qualified and Rolls Royce, ITP approved.</p> <p>It participates to 2014 and 2015 A.G.S PTP program.</p> <p>The Quality manual is structured according to ISO 9001:2008 standard.</p>	<p><u>Minor deviation:</u></p> <ul style="list-style-type: none"> <li>- No inclusion rate PTP test performed in the last 2 years. Kit 10-4 (A.G.S PTP program) could have been performed.</li> </ul> <p><u>Preventative:</u></p> <ul style="list-style-type: none"> <li>- The laboratory does not have the SAFRAN storage specification GRF-0086.</li> </ul> <p><u>Remark:</u></p> <ul style="list-style-type: none"> <li>- The laboratory does not participate in I.R.R equipments.</li> <li>- The laboratory did not record information about elevated tensile furnaces on document: "Safran R&amp;T Equipment".</li> </ul>

<b>Motivation de la décision</b> <i>Roots of the decision</i>
<p>Haynes International is a captive laboratory of raw material manufacturer. The facility is Nadcap MTL accredited on the scope of the AQPS.</p> <p>The Quality manual is structured according to ISO 9001:2008 standard.</p> <p>The last CRQPS report (17/12/2013) shows one minor deviation (200007392) which could be verified by this on-file audit.</p> <p>The laboratory participated in 2014 and 2015 to A.G.S PTP program. Nevertheless, no inclusion rate PTP test performed in the last 2 years. Kit 10-4 (A.G.S PTP program) could have been performed (Major deviation).</p> <p>The laboratory does not have the SAFRAN storage specification GRF-0086 (Preventative).</p> <p>Request for extension of the scope: heat treatment (XG regarding AMS 2750 E and 816-111) and impact (N regarding ASTM E-23). Calibration certificates have been provided, and PTP report for impact bending test submitted.</p> <p>It is recommended to renew the AQPS with the actual restrictions; With inclusion rate test on enhanced monitoring (PTP results would be awaited), to add XG and N codes and to record standards (ASTM E930 and ASTM E1181) for L1a, L1b, L1e codes (Mentioned in DQ but not in AQPS).</p> <p>After CAR closed, the renewal of your qualification is pronounced.</p>
Pièces Jointes / Attachments: DQ completed and associated CAR.

<b>Observations éventuelles Fournisseurs</b>
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Not applicable. File audit.

Supplier Signature  
( si observations /if remarks  
only)

Eléments analysés Items reviewed			
1	Qualification Questionnaire DQ6999-2	2	Safran Special Processes Qualification Certificate.
3	AS 9100C and ISO 9001:2015 certificate (N°950970071).	4	GE Transportation approval (N°19762 on 22/02/2016).
5	Check list labo 2.	6	CRQPS on 17/12/2013 (N°YQL n°03655/14).
7	Organization charts	8	Airbus attestation letter (N°FM1504915).
9	ITP group supplier approval (N°E-434-SA on 15/11/2012).	10	Nadcap MTL accreditation (N°7893162373).
11	Rolls Royce certificate of approval (N°10948 on 29/10/2012).	12	Quality manual (Rev 6 updated on 25/05/2016).
13	Quality control instructions list.	14	Corrective action request (N°200007392).
15	Safran R&T PTP- IRR Summary	16	Safran R&T Equipment
17	Safran R&T Personnel Summary	18	Safran R&T Procedure Summary
19	AGS 2015 - Kit 1-1 Report	20	AGS 2015 - Kit 2-1 Report
21	AGS 2015 - Kit 5-1 Report	22	AGS 2015 - Kit 10-1 Report
23	AGS 2015 - Kit 10-3 Report	24	AGS 2014 - kit 1-1 Report
25	AGS 2014 - kit 2-1 Report	26	AGS 2014 - kit 5-1 Report
27	AGS 2014 - kit 10-1 Report	28	AGS 2014 - kit 10-3 Report
29	Calibration certificate TUS - QC #10	30	Calibration certificate TUS -LB #1
31	Haynes International report 8192015 750MPX53366	32	Haynes International report 4112016 160655-1
33	Haynes International Nonconformance Report B1406	34	Haynes International Nonconformance Report B1407
35	Calibration inspection reports.	36	Emails between Mrs Kessab and Mr Hunt.
37	Emails between Mr Trecu and Mr Hunt.	38	

Tableau des écarts <i>Deviation table</i>						
N° de l'écart <i>Deviation n°</i>	Niveau <sup>(4)</sup> <i>Level</i>	Procédé <i>Process</i>	Description de l'écart <i>Non Conformance Report Responsible</i>	Responsable <i>Responsible</i>	Délai <i>Time limit</i>	Statut <i>Status</i>
200009341	m	§ 5.9	No inclusion rate PTP test performed in the last 2 years. Kit 10-4 (A.G.S PTP program) could have been performed.	Daniel HUNT	March 31, 2017	Closed

(4) : C = critique / *critical*

M = majeur / *major*

m = mineur / *minor*

Tableau des Recommandations <i>Préventives table</i>		
N° de la recommandation <i>Preventive n°</i>	Procédé <i>Process</i>	Description <i>Description</i>
1	§ 4.13	The laboratory does not have the SAFRAN storage specification GRF-0086.



Scope	Chap. ISO 17025	Statement	Comments
<b>4- Management requirements</b>			
Quality manual and procedures	4.2	S	Quality manual is usable for all Haynes International facilities and has been reviewed on 25/05/2016. The Quality manual is structured according to ISO 9001:2008 standard.
Document control	4.3	A	Section 4.2.3 of the Quality manual. Instructions QCI 0051 "Procedures for Document Control" and QCI 0611 "Shop Floor Reporting System and the Addition, completion, and Deletion of Route Card Operations" have not been submitted.
Review of requests and contracts	4.4	A	Section 7.2 of the Quality manual. Instruction QCI 2320 "Customer Related processes – Order Entry and Inquiry" has not been provided.
Subcontracting of tests	4.5	A	Section 8.2.4 of the Quality manual.
Purchasing services and supplies	4.6	A	Section 7.4 of the Quality manual. Instruction QCI 6867 "Subcontractor and Supplier Evaluation" has not been provided.
Service to the customer	4.7	A	Section 8.2.1 of the Quality manual. Instruction QCI 13001 "Customer Satisfaction" has not been provided.
- Complaints - Control of nonconforming testing work - Corrective action	4.8 to 4.12	A	Sections 8.3 to 8.5 of the Quality manual. Instructions QCI 0100 "Procedure for Implementing Corrective and Preventive Action", QCI 0052 "Control of Nonconforming Product" have not been provided.
Management reviews	4.15	S	Section 5.6 of the Quality manual.
Control of records	4.13	P	Sections 4.2.4 and 7.6 of the Quality system manual. Instructions QCI 0255: "Record Retention Prior to Archiving" and QCI 0260 "Archives" have not been submitted. <u>Preventative:</u> The laboratory does not have the SAFRAN storage specification GRF-0086.
Internal audits	4.14	A	Section 8.2.2 of the Quality manual. Audits refer to instruction QCI 0054 "Quality System Internal Audits" (Instruction not submitted).

C = Critique / Critical    M = Majeur / Major    m = Mineur / Minor    P = Préventive / Preventative  
S = Satisfaisant / Satisfying    A = Acceptable / Acceptable    N/A = Non applicable / not applicable

Scope	Chap. ISO 17025	Statement	Comments
<b>5- Technical requirements</b>			
Personnel	5.2	S	Section 6.2 of the Quality manual. The skill matrix and organization charts have been provided.
Accommodation and environmental conditions	5.3	A	Section 6.3 of the Quality manual. The laboratory mentions that ambient conditions do not have a direct impact on the quality of the results produced by the laboratory (§ 1.3.1 of the DQ).
Test methods	5.4	A	Quality control instructions list and procedure summary have been provided.
Equipment	5.5	A	Each equipment has a unique identification number as recorded on the "Mechanical test laboratory equipment" list.
Measurement traceability – Calibration	5.6	A	Equipments are recorded to be calibrated for 3 to 36 months. Calibration reports have been provided for 2 impact testers and 2 Heat treatment furnaces. <u>Remark:</u> The laboratory did not record information about elevated tensile furnaces on document: "Safran R&T Equipment".
PTP	5.9	m	2015 I.R.R and P.T.P tests summary has been provided. The AQPS participated in 2014 and 2015 to A.G.S PTP program for codes (A, B, L1a, R and N). Corrective action reports submitted for class 3 results (2014 kit 2-1 and kit 10-1). <u>Minor deviation:</u> No inclusion rate PTP test has been performed in the last 2 years. Kit 10-4 (A.G.S PTP program) could have been performed. <u>Remark:</u> The laboratory does not participate in I.R.R equipments.
Test reports	5.10	S	No information submitted. The facility is Nadcap MTL accredited.

C = Critique / *Critical*    M = Majeur / *Major*    m = Mineur / *Minor*    P = Préventive / *Preventative*  
S = Satisfaisant / *Satisfying*    A = Acceptable / *Acceptable*    N/A = Non applicable / *not applicable*

**Contexte / Context**

*The audit has been decided by SNECMA in order to renew the qualification of the laboratory (End of validity 31<sup>st</sup> December 2016).*

**1) Résultats de l'audit système / Results of the System Audit**

*See charts on pages 4 and 5.*

**2) Résultats de la reconnaissance d'Aptitude / Results of the capability recognition survey****2.1) Examen des moyens / Survey of the facility**

*Not applicable. File audit. Facility could not be evaluated on site.*

**2.2) Examen documentaire / Survey of the documentation**

*See charts on pages 4 and 5.*

**2.3) Examen de la qualification des opérateurs / Survey of the qualification of the personnel**

*See chapter 5.2 on page 5 of the chart. File audit.*


**2.4) Examen de la mise en œuvre du procédé / Survey of the implementation of the process**

*Not applicable. File audit. The implementation of the process could not be evaluated on site.*

**2.5) Examen des essais croisés (partie spécifique aux essais laboratoires)**



*See chapter 5.9 on page 5 of the chart. File audit.*

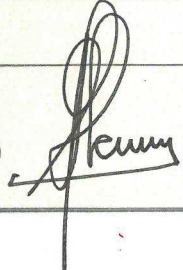
A remplir par l'émetteur (To be filled by source)

	<b>DEMANDE D'ACTION(S) CORRECTIVE(S)</b> (Corrective Action Request C.A.R)		DAC N° <b>200009341</b> N° Pos. [Identification CAR nr]
	Intervention effectuée le : <b>On questionnaire</b> (Intervention date)		Référence courrier: [Ref. letter]
Origine : <b>Externe</b>		Date : <b>February 21, 2017</b> (Date issued)	
Sujet : <b>Ecart avec l'ISO 17025</b> (subject)		<b>AQPS 73</b>	
Nom et site du Fournisseur: <b>Haynes International</b> (Supplier's name and site)		N° Fournisseur: <b>46904 KOKOMO</b> (Supplier Purchase code number)	Casq-it n° 001993-00 / MDM503309

Description de la non-conformité (Non-conformance description)	
<p>No inclusion rate PTP has been performed in the last 2 years. Kit 10-4 (A.G.SPTP program) could have been performed. (ISO 17025 § 5.9.).</p>	
Classement (Criticality): <b>mi</b>	<b>C : critique(critical) Ma : majeure(major) mi : mineure(minor)</b>
Nom émetteur : <b>Michel BIDEAU</b> (Assessor)	A répondre pour le : <b>March 21, 2017</b> (Due date)

A remplir par le destinataire (To be filled by addressee)

CAUSES racines (Root causes)	Méthodologie (Method)
Section 1.4.1 of the DQ-6999 document was not completed correctly. The E45 inclusion test was incorrectly identified as a test used for certification. The AGS/PTP test is not required for internal evaluation. However, no production material has been rated in the R&T Met Lab in the last five years.	
ACTIONS CORRECTIVES (Corrective actions)	Application (Implementation)
Remove reference to SOP 459-002-003 from R&T SOP 816-117 and update with correct SOP number. Re-write Section 6.2 of SOP 816-117 to address that any inclusions in QC Material are returned to a degreed Metallurgist or MET Control for disposition.  4/25/17 Doc# 816-117 reference to Doc# 459-002-003 was removed from section 3.4. Also inclusion was added to section 6.2 as noted in the C/A and 6.12 to notify Metallurgical Control Laboratory.	Date réalisation prévue (planned completion)  <b>4/14/17</b>
Nom du représentant de la société: (Organization representative name) <b>Dan Hunt</b>	Signature : (Signature) 
Date : (Current Date) <b>8/1/17</b>	
Vérification de la réalisation des actions par le Fournisseur (Verification of the implementation of the completed corrective actions by the Supplier)	
Nom du représentant de la société: (Organization representative name) <b>Debbie Denny</b>	Signature : (Signature) 
Date : (Current Date) <b>8/1/17</b>	

Vérification des actions correctives par l'émetteur / Commentaires : (verification of the completed corrective actions by the assessor / Comment)			
Date : <b>03/08/17</b> (Verification Date)	Soldée Date : <b>03/08/17</b> Clôturée Date :	Nom : <b>BIDEAU</b> (Name) : <b>Michel</b>	Signature : (Signature) 



### 3. PREVENTIVE MAINTENANCE AND CALIBRATION

3.1 The Leitz MM5 and Leica DMI 5000 Metallographs (Serial Numbers 348332 and 348333) shall be routinely evaluated for proper working order by a Metallurgical Technician. Preventive maintenance and calibration to ASTM E1951, shall be performed in a six month period by a representative of a qualified outside vendor.

3.1.1 PM activities shall include, but not limited to, cleaning and aligning optics and lamps, performing mechanical cleanings and lubrication, squaring irises (horizontal and vertical), squaring and adjusting mirror, perform magnification check on all the lenses and verify tamper resistance.

3.2 If adjustment is considered necessary, the service representative from the qualified vendor shall be contacted for repair and the testing unit will be taken out of service until the repair is completed.

3.3 Copies of the certifications furnished by the outside vendor, shall be kept on file in the Technology Metallurgical Laboratory and the Measurement Standards Calibration Laboratory.

### 4. METALLOGRAPH PROCEDURE

4.1 Lietz MM5 Metallograph Operation

4.1.1 Measurements can be measured using the eye piece reticle. Each division on the reticle is as follows:

25x	.004"
50x	.002"
100x	.001"
200x	.0005"
500x	.0002"
1000x	.0001"

Denotes Change - Deleted 3.4

3. PREVENTIVE MAINTENANCE AND CALIBRATION

3.1 The Leitz MM5 and Leica DMI 5000 Metallographs (Serial Numbers 348332 and 348333) shall be routinely evaluated for proper working order by a Metallurgical Technician. Preventive maintenance and calibration to ASTM E1951, shall be performed in a six month period by a representative of a qualified outside vendor.

3.1.1 PM activities shall include, but not limited to, cleaning and aligning optics and lamps, performing mechanical cleanings and lubrication, squaring irises (horizontal and vertical), squaring and adjusting mirror, perform magnification check on all the lenses and verify tamper resistance.

3.2 If adjustment is considered necessary, the service representative from the qualified vendor shall be contacted for repair and the testing unit will be taken out of service until the repair is completed.

3.3 Copies of the certifications furnished by the outside vendor, shall be kept on file in the Technology Metallurgical Laboratory and the Measurement Standards Calibration Laboratory.

3.4 The grid sheets for the Leitz MM5 labeled CIN# 816-02-01 160X measuring template and CIN# 816-03-01 800X measuring template for the Magnaviewer, is verified by a representative of a qualified outside vendor. Calibrations shall be performed twice a year.

4. METALLOGRAPH PROCEDURE

4.1 Lietz MM5 Metallograph Operation

4.1.1 Measurements can be measured using the eye piece reticle. Each division on the reticle is as follows:

25x	.004"
50x	.002"
100x	.001"
200x	.0005"
500x	.0002"
1000x	.0001"

OBSOLETE  
TO BE USED  
FOR REFERENCE  
INFORMATION ONLY



- 5.10 View entire specimen at 100x. If any irregular conditions exist in the mount, view the sample at appropriate magnification to determine the extent of the irregular condition. Complete the test sample: Routing and Record Report and put results in computer. Send routing to Material Release Department for posting on master heat card.
- 5.11 Acceptance standards generated by the laboratory are approved by a degreed Metallurgist or equivalent (see Section 12.4), prior to release for general use. The acceptance standards require approval by degreed Metallurgist or equivalent. If there is a metallographic feature not covered by an acceptance standard, then it is referred to a degreed Metallurgist or equivalent.

6. DISCREPANT MATERIAL

- 6.1 Abnormal grain size
- 6.2 Inclusions
- 6.3 Excessive carbide segregation
- 6.4 Cracks, seams, voids
- 6.5 Under annealing
- 6.6 Over heating
- 6.7 Cold work in material that is supposed to be solution annealed
- 6.8 Slow cooling-carbide precipitation in grain boundaries
- 6.9 Excessive intergranular oxidation and/or pickle attack
- 6.10 Carburization, decarburization, nitrogen diffusion, etc.
- 6.11 Improperly identified alloy
- 6.12 If any of the above conditions exist, notify Metallurgical Control Laboratory for disposition.

Denotes Change - Deleted Note