Proficiency Testing (PT) Scheme on Chemical analysis of the components in stainless steel

1. Nature and Objective of the Scheme:

Stainless steels are one of the common materials in metallurgy, machinery, railway, aviation and other fields. The elements such as carbon, silicon, manganese, phosphorus, sulphur, chromium, nickel and titanium in stainless steel are routine analysis items for most laboratories. The number of relevant PT programmes available is very limited all around world, and majority of the participants showed strong interests to have a round PT scheme for stainless steels. The main purpose of the proposed PT scheme is to evaluate the performance of laboratories providing such testing services.

This PT scheme will be organised by the China National Accreditation Service for Conformity Assessment (CNAS) and executed by the China NIL Research Centre for Proficiency Testing, as the collaborator under the auspices of Asia-Pacific Laboratory Accreditation Cooperation (APLAC).

2. Responsibilities

CNAS is responsible for submitting proposal to APLAC PT Committee, inviting participants, collecting test results from all participating laboratories, issuing and sending final report to participating accreditation bodies. NIL is responsible for preparing and dispatching samples, performing homogeneity tests and assessment, conducting statistical analysis of data.

Contact information of CNAS as follows:

Ms. GE Manli, Mr ZHAI Peijun
Zhongren Building, A10 Chaowai Dajie, Beijing, 100020. China
TEL: ＋86-10-65994541
FAX: ＋86-10-65994408
Email: pt@cnas.org.cn

Contact information of NIL as follows:

Mr. GAO Wengong, Ms. KONG Xinxin
China NIL Research Centre for Proficiency Testing
Tel: +86 10 62185713, +86 10 62188310
Email: nil@analysis.org.cn
Website: http://www.nil.org.cn

3. Selection of Participants

Invitations will be sent to all APLAC members and other accreditation bodies (i.e. EA, IAAC members and non-affiliated accreditation bodies) as soon as this proposal is approved by the APLAC PT Committee. Participating accreditation bodies will be asked to nominate laboratories to participate and indicate the accreditation status of the nominated laboratories. A restriction on the number of participating laboratories from each accreditation body may need to be imposed. The total number of laboratories for the project shall be preferably limited to 100.

4. Preparation of Sample

A kind of stainless steel (ϕ36mm) was selected in the production field, and lathed into ϕ36×12mm block samples. Eight elements are required to be determined, and the content ranges of the elements are showed in the table below.

Unit: mass %

C	Si	Mn	P	S	Cr	Ni	Ti
0.03～0.08	0.5~1	1~2	0.01~0.05	0.01~0.05	16~19	7~9	0.2~0.7

Each participating laboratory will be provided with one ϕ36×12mm block sample. The samples may be tested by the participants' preferred method (accredited, validated, in-house, etc), generally, which are used for providing formal reports. Any analytical method such as wet chemical method, thermal (combustion) method or other physical method (e.g., spark discharge or X-ray) is acceptable. However it is preferable to use international or national consensus standards. Test results and other technical details should be reported in the result sheets provided.

5. Homogeneity and Stability Testing

Twenty blocks of the samples have been randomly selected for homogeneity in accordance with the recommendation stipulated in ISO 13528.or ISO Guide 35. Stainless steels are very stable and the steady period is more than ten years for the reference materials, so the stability testing is unnecessary.

6. Statistical Analysis

The robust statistical procedure has been chosen for the proficiency testing scheme. The median and normalised IQR, which are measures of the centre and spread of the data (respectively), are used similarly to the mean and standard deviation. As robust statistics, the median and normalised IQR are less influenced by the presence of outliers in the data. The performance of each laboratory can then be assessed by calculating the z-score which will be presented in tabular form as well as histograms. The results are commonly interpreted as follows:

$\|z\| \leq 2$	Satisfactory
$2 < \|z\| < 3$	Questionable
$\|z\| \geq 3$	Unsatisfactory

Laboratories having a |z| score larger than 3 shall investigate their results and take the corrective actions; and those having a z-score in the range $2 < |z| < 3$ are encouraged to review their results.

7. Issuance of Reports

Upon the completion of data analysis, an interim report will be drafted by NIL and audited by CNAS, then will be sent to participating laboratories and/or accreditation bodies for comment. After that, a draft final report will be prepared and be submitted to the APLAC PT Committee for review. Upon approval, an electronic copy of the final report will be forwarded to each participating accreditation bodies for distribution to the participating laboratories.

8. Proposed Time Schedule

Event	Period	Action Party
Submission of proposal to APLAC PT Committee for approval	July 2008	CNAS
Preparation of sample	Aug.– Sep. 2008	NIL
Homogeneity testing	Sep.–Oct. 2008	NIL
Invitation of participants	Oct.－Dec. 2008	CNAS
Dispatch of samples	Dec. 2008	NIL
Submission of results	Feb. 2009	NIL
Statistical analysis of results	Mar. 2009	NIL
Drafting Interim report	April. 2009	NIL
Submission of draft report to APLAC PT Committee	May. 2009	CNAS
Approval of draft report by APLAC Proficiency Committee	May. 2009	APLAC
Distribution of final report	June. 2009	CNAS or APLAC

9. Confidentiality

Each laboratory will be assigned with a unique identification code. This unique code will be used throughout the scheme. The identity and results of the participating laboratories are strictly kept confidential. If the laboratories submit their results through their accreditation bodies, their results may be disclosed to and released through their accreditation bodies.

Date: 16 Oct. 2008