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**Committee B09 on Metal Powders and Metal Powder Products
Subcommittee B09.06 on Cemented Carbides**

Research Report B09-1018

**Interlaboratory Study to Establish Precision Statements for ASTM
B887-12, Determination of Coercivity (Hcs) of Cemented Carbides**

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1. Introduction:

Interlaboratory Study 723 was conducted to establish a precision statement for B0887, Determination of Coercivity (Hcs) of Cemented Carbides.

2. Test Method:

The Test Method used for this ILS is B887-12. To obtain a copy of B0887, go to ASTM's website, www.astm.org, or contact ASTM Customer Service by phone at **610-832-9585** (8:30 a.m. - 4:30 p.m. Eastern U.S. Standard Time, Monday through Friday) or by email at service@astm.org.

3. Participating Laboratories:

The following laboratories participated in this interlaboratory study:

ATI Firth Sterling-MPD, Houston, ATI Firth Sterling, Grant AL

ATI Alldyne, Huntsville, AL

4. Description of Samples:

There were 10 samples of varying targeted results used for this study. Each sample was prepared and distributed by Gary Runyon of ATI Firth Sterling. All materials were supplied by ATI Alldyne Powder Materials.

5. Interlaboratory Study Instructions

Laboratory participants were emailed the test program instructions. For a copy of the instructions, please see Annex A.

6. Description of Equipment/Apparatus¹:

6.1 Instrumentation capable of inducing magnetic saturation and then sensing the inherent intrinsic magnetic moment of the magnetic fraction of the binder phase.

6.2 Balance having a capacity of 200 g and a sensitivity of 0.001 g.

7. Data Report Forms:

Each laboratory was provided with a data report form for the collection of data. A copy of the data is provided in Annex B.

Please note: The laboratories have been randomly coded and cannot be identified herein.

8. Statistical Data Summary:

¹ The equipment listed was used to develop a precision statement for B887-12. This listing is not an endorsement or certification by ASTM International.
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A summary of the statistics calculated from the data returned by the participating laboratories is provided in Annex C.

9. Precision and Bias Statement:

9.1 The precision of this test method is based on an interlaboratory study of ASTM B887-Standard Test Method for Determination of Coercivity (Hcs) of Cemented Carbides, conducted in 2010. Three laboratories participated in this study, recording the coercivity on three specimens each, of ten different materials. This procedure was performed three times on each material in order to determine the precision of the test method. Every “test result” represents an individual observation. Except for the limited number of participating laboratories, Practice E 691 was followed for the design and analysis of the data; the details are given in ASTM Research Report No. B09-1018.ⁱ

9.1.1 Repeatability limit (*r*) - Two test results obtained within one laboratory shall be judged not equivalent if they differ by more than the “*r*” value for that material; “*r*” is the interval representing the critical difference between two test results for the same material, obtained by the same operator using the same equipment on the same day in the same laboratory.

9.1.1.1 Repeatability limits are listed in Table 1 below.

9.1.2 *Reproducibility limit (R)* - Two test results shall be judged not equivalent if they differ by more than the “*R*” value for that material; “*R*” is the interval representing the critical difference between two test results for the same material, obtained by different operators using different equipment in different laboratories.

9.1.2.1 Reproducibility limits are listed in Table 1 below.

9.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E 177.

9.1.4 Any judgment in accordance with statement 9.1.1 and 9.1.2 would normally have an approximate 95% probability of being correct, however the precision statistics obtained in this ILS must not be treated as exact mathematical quantities which are applicable to all circumstances and uses. The limited number of laboratories reporting results guarantees that there will be times when differences greater than predicted by the ILS results will arise, sometimes with considerably greater or smaller frequency than the 95% probability limit would imply. Consider the precision limits as general guides, and the associated probability of 95% as only a rough indicator of what can be expected.

Table 1. Magnetic Saturation (G-cm³/g)

MATERIAL	Average ⁱⁱ	sr	sR	r	R
1	322.6	28.4	28.4	79.4	79.4
2	128.6	0.5	0.5	1.3	1.5
3	297.0	0.7	0.7	2.1	2.1

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