27
12-28-82
(P)

I-7143 (1)

MHSMP-82-44
Dist. Category UC-45
Dr. 1076

HNS-I Small-Scale Gap-Test Acceptance-Criteria Investigation

MHSMP--82-44

Elisha L. Demerson

DEG3 003649

DECEMBER 1982

For
Sandia National Laboratories
Albuquerque, New Mexico
(P.O. No. 50-1399)

✓
Mason & Hanger
Pantex Plant

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately-owned rights.

Printed in the United States of America
Available from
National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
Price: Printed Copy \$6.00; Microfiche \$4.00

**HNS-I SMALL-SCALE GAP-TEST ACCEPTANCE-
CRITERIA INVESTIGATION**

Elisha L. Demerson

DECEMBER 1982

For
Sandia National Laboratories
Albuquerque, New Mexico
(P. O. No. 50-1399)

ABSTRACT

HNS-I small scale gap tests were conducted at three densities to determine the effect of density on gap sensitivity and the reproducibility of the gap test. Density was found to have a lower effect on sensitivity than the existing HNS-I acceptance region indicates. The reproducibility of the gap test was determined to be ± 0.21 db at a 95% confidence level.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof nor any of their employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

INTRODUCTION

Recently, questions have been raised concerning the HNS-I gap test acceptance criteria in SNLA 5003C, para. 4.5.2.6 and SS345314, Appendix F, para. 7. Specifically, these questions have concerned the effect of density on gap sensitivity and the reproducibility of the test.

Six small scale gap test series were conducted to determine the effect of density on gap sensitivity and the reproducibility of the test. The results of these series are compared to the existing specifications and to high purity HNS currently being manufactured.

DISCUSSION

A single lot of 161 RDX-filled donors was prepared for this test series. Twenty of the donors were randomly selected for the donor acceptance test per O&I Standard 6-2042. The average density of the donors was 1.580 Mg/m^3 with a standard deviation of 0.001 Mg/m^3 . The average dent depth of the twenty donors selected for the donor acceptance test was 1.60 mm with a standard deviation of 0.002 mm. The average dent depth must be greater than 1.595 mm and $< 1.65 \text{ mm}$ with a standard deviation of no more than 0.04 mm to be acceptable.

The six tests series were divided into three groups based on acceptor density. Two each were conducted at densities of $1.51 \pm 0.0075 \text{ Mg/m}^3$, $1.535 \pm 0.0075 \text{ Mg/m}^3$ and $1.56 \pm 0.0075 \text{ Mg/m}^3$. Actual densities and resulting decibang values are summarized in Table I. These data are also shown in Fig. 1 relative to the existing acceptance region.

Table I. Summary of Results
(HNS-I, Lot 1121-07C-006)

Mean Density (g/cc)	Decibang Value
1.513*	5.826
1.514	5.701
1.535	5.813
1.536	5.813
1.561	5.781
1.561	5.922

Fig. 1. Small Scale Gap Test Sensitivity of HNS-I, Lot 1121-07C-066
Compared to Existing HNS-I Specification

Applying least-squares linear regression to the data of Table I, a linear relationship between decibang values and density was derived of the form:

$$x = md + b$$

where:

- m = slope of the line
- b = x-intercept
- x = decibang
- d = density

yielding the center line equation $x = 1.840D + 2.983$ (see Fig. 2).

The slope of this line is 1.840 compared to a slope of 3.56 for the existing specification. The slope represents the effect of density on gap sensitivity.

Upper and lower confidence limits for this HNS-I lot based on 95 and 99.5% around the centerline are shown in Fig. 2.

Fig. 2. Best-Fit Line

The equations for these limits are:

$$\text{upper line at 99.5\%: } X_2 = 1.840 D + 3.433$$

$$\text{upper line at 95.0\%: } X_2 = 1.840 D + 3.213$$

$$\text{lower line at 95.0\%: } X_1 = 1.840 D + 2.753$$

$$\text{lower line at 99.5\%: } X_1 = 1.840 D + 2.533$$

In Fig. 3, the gap sensitivities of Mason & Hanger HNS-I production lots given in Table II are plotted. One of these lots (1077-07C-005) is outside the 95% confidence limits of Lot 1121-07C-006.

Fig. 3. HNS-I Production Lot Results Compared to Confidence Limits of Lot 1121-07C-006

Table II. HNS-I Production Lots of Small-Scale Gap Test Results

Mean Density (g/cc)	Lot No.	Decibang Value
1.540	7157-07C-001	5.834
1.538	7231-07C-002	5.980
1.536	7312-07C-003	5.813
1.532	0339-07C-004	5.549
1.530	1077-07C-005	5.577
1.535	1313-07C-007	5.775

COMMENTS AND CONCLUSIONS

The existing HNS-I gap test sensitivity specification shows a greater dependency on density than was observed in this series of tests. The decibang width of the current specification is near that of the 99.5% confidence level limits determined for Lot 1121-076-006.

ACKNOWLEDGEMENT

The author gratefully acknowledges the contributions made by Robert Ashcraft, Project Scientist, and Debbie Carr, Engineering Technician.