

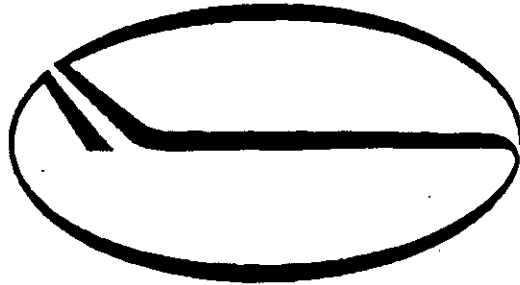
**DOCKET NO.: SA-515
EXHIBIT NO. 11G**

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.**

ATTACHMENT 16

**NONDESTRUCTIVE GUIDELINES FOR INSPECTOR
(DELTA) TRAINING BY AIR TRANSPORT ASSOCIATION
ATA SPECIFICATION 105**

(7 PAGES)



**GUIDELINES FOR TRAINING AND
QUALIFYING PERSONAL IN
NONDESTRUCTIVE TESTING METHODS**

ATA SPECIFICATION 105

AIR TRANSPORT ASSOCIATION OF AMERICA

1301 Pennsylvania Avenue, N.W.
Suite 1100
Washington, DC 20004-1707
Phone (202) 626-4036

REVISION 4
Printed in USA

①



LIST OF EFFECTIVE PAGES

<u>CHAPTER/ SECTION</u>	<u>PAGE</u>	<u>DATE</u>
List of Effective Pages	1	Sept 07/93
Table of Contents	1	Sept 07/93
	2	Feb 15/91
	3	Feb 15/91
Introduction	1	Jan 15/90
1-1	1	Sept 07/93
1-1	2	Sept 07/93
1-1	3	Sept 07/93
1-1	4	Sept 07/93
1-1	5	Sept 07/93
1-1	6	Sept 07/93
1-1	7	Sept 07/93
1-1	8	Sept 07/93
2-0	1	Feb 15/91
2-1	1	Jan 15/90
2-1	2	Jan 15/90
2-1	3	Jan 15/90
2-1	4	Feb 15/91
2-1	5	Jan 15/90
2-1	6	Jan 15/90
2-1	7	Jan 15/90
2-1	8	Feb 15/91
2-2	1	Jul 15/90
2-2	2	Jan 15/90
2-2	3	Feb 15/91
2-3	1	Jul 15/90
2-3	2	Jul 15/90
2-3	3	Feb 15/91
2-4	1	Jan 15/90
2-4	2	Feb 15/91
2-5	1	Feb 15/91
2-5	2	Feb 15/91
2-5	3	Feb 15/91



CHAPTER/SECTION PAGE

LIQUID PENETRANT TRAINING COURSE

2-4

A.	Introduction	1
B.	Liquid Penetrant Processing	1
C.	Selection of Penetrant Test Methods	1
D.	Liquid Penetrant Test Equipment	1
E.	Liquid Penetrant Indications	1
F.	Inspection Procedures & Standards	2
G.	Final Written/ Practical Examination	2

EDDY CURRENT TESTING TRAINING COURSE

2-5

A.	Introduction	1
B.	Eddy Current Theory	1
C.	Types of Sensing Elements	1
D.	Factors Which Affect Coil Impedance	2
E.	Signal/Noise Ratio	2
F.	Selection of Test Frequency	2
G.	Coupling	2
H.	Field Strength & Its Selection	3
I.	Instrument Design Consideration	3
J.	Read-Out Mechanism	3
K.	Applications	3
L.	Reference Standards and Operating Procedures	3
M.	Final Written/ Practical Examination	3



SPECIFICATION NO. 105

1. LIQUID PENETRANT TRAINING COURSE

A. Introduction

- (1) Brief history of nondestructive testing and liquid penetrant testing
- (2) Purpose of liquid penetrant testing
- (3) Basic principles of liquid penetrant testing
- (4) Types of liquid penetrants commercially available

B. Liquid Penetrant Processing

- (1) Preparation of parts
- (2) Application of penetrant to parts
- (3) Removal of surface penetrant
- (4) Developer application and drying
- (5) Inspection and evaluation
- (5) Post-cleaning

C. Selection of Penetrant Test Methods

- (1) ~~Advantages of various methods~~
- (2) ~~Disadvantages of various methods~~

1. Water Wash Method
2. Post-Emulsified Method
3. Solvent Removal Method

D. Liquid Penetrant Test Equipment

- (1) Liquid penetrant test units
- (2) Lighting for liquid penetrant inspection
- (3) Materials for liquid penetrant testing
- (4) Precautions in penetrant inspection

E. Liquid Penetrant Indications

- (1) General
 - (a) Reason for indications
 - (b) Appearance of indications
 - (c) Time for indications to appear
 - (d) Persistence of indications



SPECIFICATION NO. 105

- 2. Factors affecting indications
 - a. Penetrant used
 - b. Prior processing
 - c. Technique used
 - 3. Establishing ~~acceptance~~ ^{Control} standards
 - a. ~~Lack of "standards"~~ ^{Tan Panels}
 - b. ~~Standards for repetitive inspection~~ ^{L.C.F. Blocks}
 - 4. Indication from cracks
 - a. Cracks occurring during solidification
 - b. Cracks occurring during processing
 - c. Cracks occurring during service
 - 5. Indications from laminar discontinuities
 - a. Cold shut or fold
 - b. Forging Laps
 - c. Extrusion defect
 - d. Seams
 - 6. Indications from porosity
 - 7. Nonrelevant indications
- F. Inspection Procedures and Standards
- 1. Inspection procedures
 - 2. Standards
- G. Final Written/Practical Examination

TOTAL TIME (HOURS)

~~20~~ 20

2-4 Feb 15/91

5

Appendix G

LIQUID PENETRANT TESTING

I. LIQUID PENETRANT

A. Introduction

1. Brief history of nondestructive testing and liquid penetrant testing
2. Purposes of liquid penetrant testing
3. Basic principles of liquid penetrant testing
4. Types of liquid penetrants commercially available
 - a. Industry types - all types
 - b. Specific types used at Delta Air Lines

B. Liquid Penetrant Processing

1. Preparation of parts
 - a. Proper cleaning
 - b. Paint and coating removal
 - c. Chemical etching
2. Application of penetrant to parts
3. Removal of surface penetrant
 - a. Water Wash
 - b. Post-emulsification
 - c. Solvent removal
4. Developer application and drying
5. Inspection and evaluation
6. Post-cleaning

C. Selection of Penetrant Test Methods

1. Water wash method
2. Post-Emulsification method
3. Solvent removal method

D. Liquid Penetrant Test Equipment

1. Liquid penetrant test units.
 - a. Required temperatures
 - b. Required pressures
 - c. Required time control
2. Lighting for liquid penetrant inspection
3. Materials for liquid penetrant testing
4. Precautions in penetrant inspection
 - a. Fire Hazards
 - b. Eye and skin protection

6

E. Liquid Penetrant Indications

1. General
 - a. Reason for indications
 - b. Appearance of indications
 - c. Time for indications to appear
 - d. Persistence of indications
2. Factors affecting indications
 - a. Penetrant used
 - b. Prior processing
 - c. Technique used
3. Establishing control standards
 - a. Tam panels
 - b. L.C.F. Blocks
4. Indication from cracks
 - a. Cracks occurring during solidification
 - b. Cracks occurring during processing
 - c. Cracks occurring during service
5. Indications from laminar discontinuities
 - a. Cold shut or fold
 - b. Forging Laps
 - c. Extrusion defect
 - d. Seams
6. Indications from porosity
7. Nonrelevant indications

F. Inspection Procedures and Standards

1. Inspection procedures
2. Standards

G. Final Written/Practical Examination