



Report No. 1096

**Magnetic Particle Inspection
Proficiency Testing Program**

Round 3

September 2018

ACKNOWLEDGMENTS

PTA wishes to gratefully acknowledge the technical assistance provided for this program by Mr V Mierzwa.

© Copyright Proficiency Testing Australia 2018
P O Box 7507, Silverwater NSW 2128, Australia



CONTENTS

1	Foreword	1
2.	Program Features and Design	1
3.	Reporting by Participants	1
4.	Reference Values	2
5.	Summary of Results	2
6.	PTA and Technical Adviser's Comments	2
7.	References	3

APPENDIX A

Summary of Reported Results	A1
-----------------------------	----

APPENDIX B

Inspection Reports	B1
--------------------	----

APPENDIX C

Instructions to Participants	C1
------------------------------	----

APPENDIX D

Summary Report to Participants	D1
--------------------------------	----

1. Foreword

This report summarises the results of the third round of an interlaboratory comparison on Magnetic Particle Inspection of welded butt joints in metal. This program is accredited to ISO/IEC 17043:2010 "*Conformity assessment - General requirements for proficiency testing*" by International Accreditation New Zealand (IANZ).

Proficiency Testing Australia (PTA) conducted the program from December 2017 to August 2018. The Program Coordinator was Dr M Li. The Technical Adviser was Mr V Mierzwa. This report was authorised by Mrs K Cividin, PTA Quality Manager. The aim of the program was to assess laboratories' ability to competently perform the prescribed analyses.

2. Program Features and Design

- 2.1 Each laboratory was randomly allocated a unique code number for the program to ensure confidentiality of results. Reference to each laboratory in this report is by code number only.
- 2.2 Participants were provided, upon their request, with one of the following test specimens:
- plate; or
 - Y;

Laboratories were also provided with the "Instructions to Participants" (refer Appendix C).

- 2.3 Eleven laboratories from Australia participated in this program. Eleven sets of results were submitted to PTA for assessment. Results are presented in Appendix A for each laboratory.

3. Reporting by Participants

Laboratories were asked to test the relevant specimen using magnetic flow induced by AC in accordance with AS 1171, and to report their results in accordance with AS 1171 Section 5 and relevant clauses of AS 4037 Section 14; to record non-compliant discontinuities, including type, length, and location from datum point on an appropriate drawing.

Evaluation of the test item was conducted in accordance with AS 4037 Table 8.3 Class 1 or Table 8.4 Class 1.

4. Reference Values

A total of five test pieces were used, consisting of three plates (PTA0036, PTA0037 and PTA0041), and two Ys (PTA0039 and PTA0044). The reference value for each test piece is presented in Appendix B.

High quality and repeatable reference test pieces were supplied by Sonaspection International Ltd. Independent testing to confirm the reference values was conducted by Advanced Technology Testing and Research (ATTR).

Laboratories were required to test the test pieces in accordance with AS 1171 Section 5 and relevant clauses of AS 4037 Section 14. In all cases, the test pieces and discontinuities present left no doubt or ambiguity as to their conformance with either of the aforementioned standards.

5. Summary of Results

The test reports from participants were forwarded to the Technical Adviser for assessment. The various components of Magnetic Particle Inspection reports were allocated a particular score to be used as assessment criteria. (See Appendix D – Summary Report for score breakdowns). The scores for each test report were added to give a total score. The overall scores were classified as follows:

- 70 - 100 pass
- 0 - 69 fail

A summary of the results returned by participating laboratories for each test appears in Appendix A. Each participating laboratory was provided with a Summary Report detailing its performance. An example of the Summary Report is included in Appendix D.

6. PTA and Technical Adviser's Comments

The majority of participant results are consistent with the reference values, as shown in Appendix A.

A number of the reports issued by participating laboratories did not adequately address the reporting requirements specified by AS 1171 Section 5 and relevant clauses of AS 4037 Section 14.

The number of reports that were deficient of information indicates that there is room for improvement in this area. Individual laboratories, and the non-destructive testing (NDT) industry in general, should consider reporting standardisation and simplification and place greater emphasis and importance on report details and terminology. Variance of defect measurement between all laboratories was considered to be within expectations.

It should be noted that most participating laboratories presented reports and work sheets which were of a very high standard. A minority of participants submitted responses which had significant deficiencies and this raises concerns regarding the technical control of those laboratories.

7. References

- [1] *Guide to Proficiency Testing Australia*, 2016.
This document can be found on the PTA website at www.pta.asn.au.
- [2] AS 1171:1998 *Non-destructive testing – Magnetic particle testing of ferromagnetic products, components and structures*.
- [3] AS 4037:1999 *Pressure equipment – Examination and testing*.

APPENDIX A

Summary of Reported Results

LABORATORY RESULTS (TEST PIECE ID: PTA0036 - PLATE)

LABORATORY CODE	OVERALL RATING			COMMENTS
	DOCUMENTATION ASSESSMENT		TOTAL	
	WORK SHEETS	FINAL REPORTS		
3	20	18	38	fail
4	16.5	0	16.5	fail
5	20	18.5	38.5	fail

LABORATORY RESULTS (TEST PIECE ID: PTA0037- PLATE)

LABORATORY CODE	OVERALL RATING			COMMENTS
	DOCUMENTATION ASSESSMENT		TOTAL	
	WORK SHEETS	FINAL REPORTS		
2	80	19	99	pass
6	20	15.5	35.5	fail
11	80	19	99	pass

LABORATORY RESULTS (TEST PIECE ID: PTA0041 - PLATE)

LABORATORY CODE	OVERALL RATING			COMMENTS
	DOCUMENTATION ASSESSMENT		TOTAL	
	WORK SHEETS	FINAL REPORTS		
1	72.5	17	89.5	pass
7	77	19.5	96.5	pass
10	80	19.5	99.5	pass

LABORATORY RESULTS (TEST PIECE ID: PTA0039 - Y)

LABORATORY CODE	OVERALL RATING			COMMENTS
	DOCUMENTATION ASSESSMENT		TOTAL	
	WORK SHEETS	FINAL REPORTS		
8	65	20	85	pass

LABORATORY RESULTS (TEST PIECE ID: PTA0044 - Y)

LABORATORY CODE	OVERALL RATING			COMMENTS
	DOCUMENTATION ASSESSMENT		TOTAL	
	WORK SHEETS	FINAL REPORTS		
9	73	15.5	88.5	pass

APPENDIX B

Inspection Reports

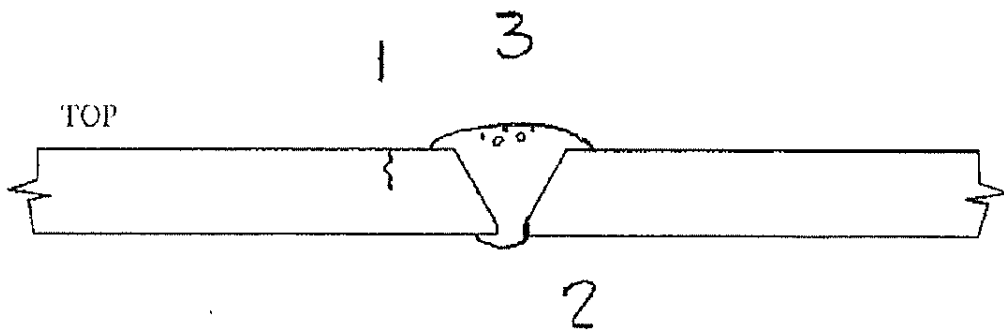
TEST SPECIMEN REPORT

Specimen ID: PTA0036

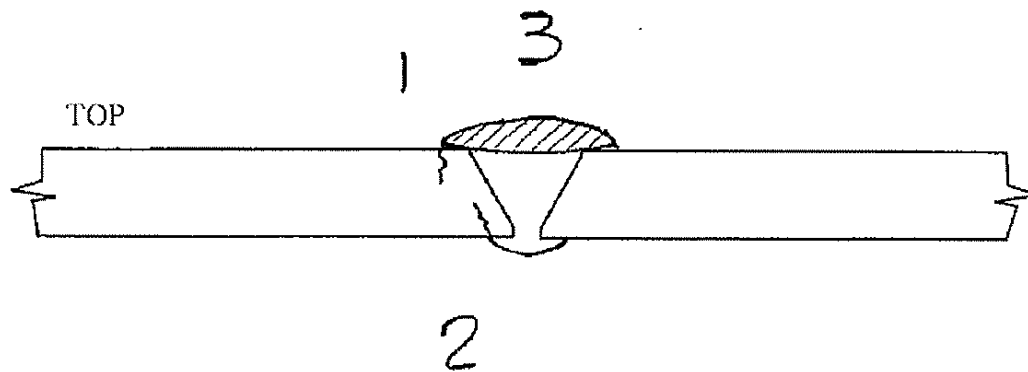
Specimen : Plate 10mm Thick x 300mm Length

Acceptance Criteria: Record all discontinuities exceeding 5 mm in length.

Specimen Cross Section:

**Inspection Results**

No.	Type	Length (mm)	Distance from 0 (mm)	Mandatory Detection
1	Haz Discontinuity	27	49	Yes
2	Root Discontinuity	19	155	Yes
3	Surface Porosity	17	209	Yes

TEST SPECIMEN REPORT**Specimen ID:** PTA0037**Specimen :** Plate 10mm Thick x 300mm Length**Acceptance Criteria:** Record all discontinuities exceeding 5 mm in length.**Specimen Cross Section:****Inspection Results**

No.	Type	Length (mm)	Distance from 0 (mm)	Mandatory Detection
1	Toe Discontinuity	21	68	Yes
2	Root Discontinuity	30	179	Yes
3	Transverse Discontinuity	15	260	Yes

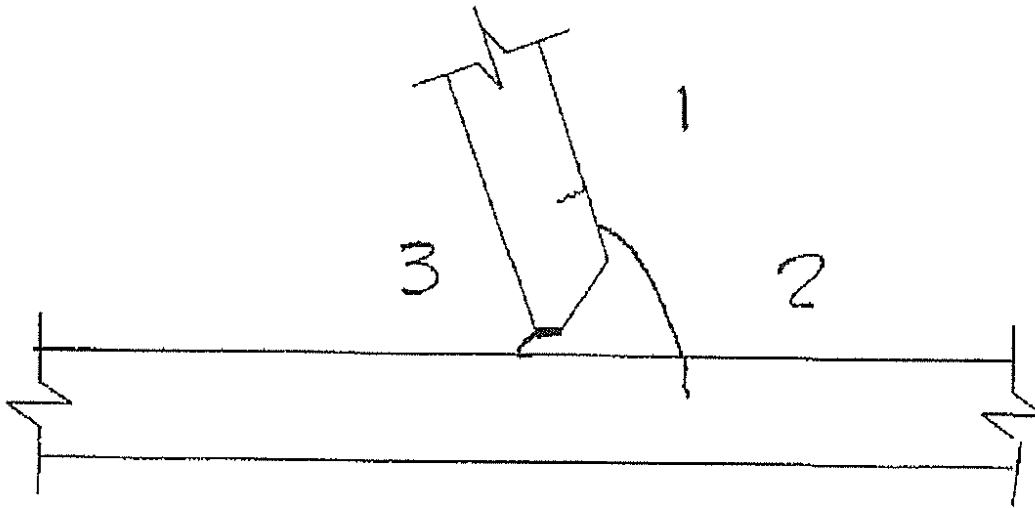
TEST SPECIMEN REPORT

Specimen ID: PTA0039

Specimen : Y 10mm Thick x 300mm length

Acceptance Criteria: Record all discontinuities exceeding 5 mm in length.

Specimen Cross Section:

**Inspection Results**

No.	Type	Length (mm)	Distance from 0 (mm)	Mandatory Detection
1	HAZ Discontinuity	25	64	Yes
2	Toe Discontinuity	22	132	Yes
3	Root Discontinuity	21	210	Yes

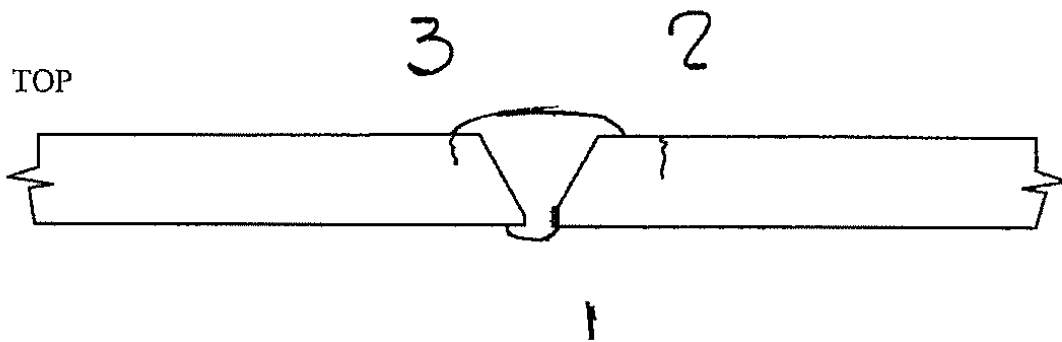
TEST SPECIMEN REPORT

Specimen ID: PTA0041

Specimen: Plate 10mm Thick x 300mm Length

Acceptance Criteria: Record all discontinuities exceeding 5 mm in length.

Specimen Cross Section:

**Inspection Results**

No.	Type	Length (mm)	Distance from 0 (mm)	Mandatory Detection
1	Lack of Root Fusion	12	61	Yes
2	HAZ Discontinuity	25	155	Yes
3	Toe Discontinuity	20	225	Yes

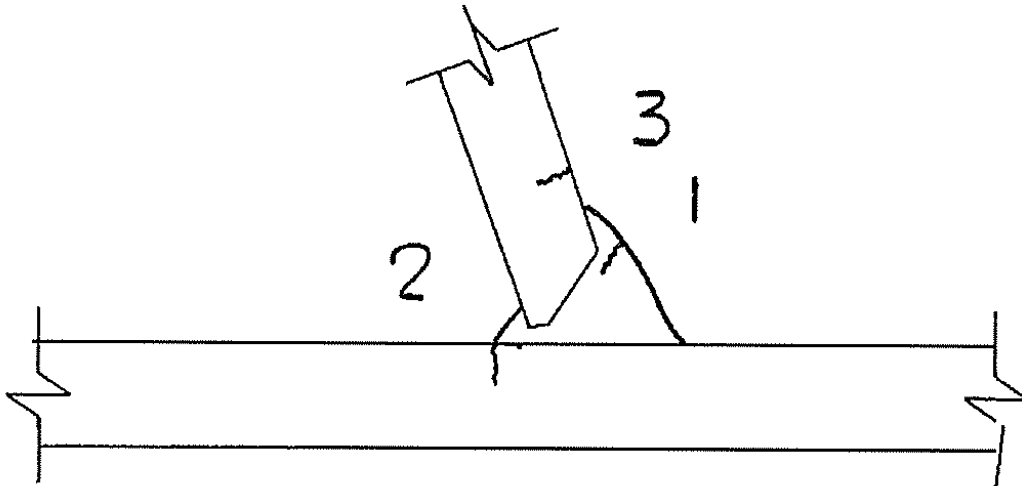
TEST SPECIMEN REPORT

Specimen ID: PTA0044

Specimen: Y 10mm Thick x 300mm Length

Acceptance Criteria: Record all discontinuities exceeding 5 mm in length.

Specimen Cross Section:



Inspection Results

No.	Type	Length (mm)	Distance from 0 (mm)	Mandatory Detection
1	Centre Line Discontinuity	21	65	Yes
2	Root Discontinuity	20	115	Yes
3	HAZ Discontinuity	20	230	Yes

APPENDIX C

Instructions to Participants

PROFICIENCY TESTING AUSTRALIA PROFICIENCY TESTING PROGRAM

MAGNETIC PARTICLE INSPECTION (ROUND 3)

INSTRUCTIONS TO PARTICIPANTS

Participants are requested to carefully note the following **BEFORE** commencing their testing.

1. **General**

The test item is not to be damaged or altered in any way. The use of grinders, files, linishers or sharp objects of any kind is prohibited.

The test should be considered as a routine inspection and, as such, all normal recording and reporting requirements shall apply.

Relevant discontinuities only are to be recorded on an appropriate drawing, which is to be provided as part of the work sheet.

2. **Test Method**

The test item is to be tested using magnetic flow induced by AC in accordance with AS 1171.

Evaluation of the pipe test item is to be conducted in accordance with AS 4037 Table 8.4 Class 1.

Evaluation of the plate test item is to be conducted in accordance with AS 4037 Table 8.3 Class 1.

Evaluation of the tee test item is to be conducted in accordance with AS 4037 Table 8.3 Class 1.

Evaluation of the Y test item is to be conducted in accordance with AS 4037 Table 8.4 Class 1 (pipe) or AS 4037 Table 8.3 Class 1 (plate).

3. **Recording and Reporting**

On an appropriate drawing, record non – compliant discontinuities, giving their type, length, and location from datum point. All reporting shall be in accordance with AS 1171 Section 5 and relevant clauses of AS 4037 Section 14.

A test report and the laboratory work sheets together with the sketches shall be submitted to Proficiency Testing Australia (PTA).

Note:

PTA expects the work sheets and test report for this proficiency test to meet the same standard required of any other job, for which your laboratory issues a test report. The majority of marks will be awarded for information provided in the work sheets.

4. Return of Test Specimen and Results

The test item is to be thoroughly cleaned and demagnetised on completion of test.

The test item, together with completed test report and laboratory work sheets are to be returned **within two weeks after receipt** to:

Dr Michael Li

Proficiency Testing Australia
PO Box 7507
SILVERWATER NSW 2128

Phone: 61 2 9736 8397

Fax: 61 2 9743 6664

Email: michael.li@pta.asn.au

APPENDIX D

Summary Report to Participants

**PROFICIENCY TESTING AUSTRALIA
MAGNETIC PARTICLE INSPECTION PROGRAM ROUND 3
SUMMARY REPORT**

LABORATORY CODE NO:
LABORATORY :
ADDRESS :
TEST PIECE ID :
LABORATORY REPORT NO. :
SYSTEM OF SCORING

A. Work Sheets

1. Name of laboratory
2. Report No.
3. Date and place of test
4. Identification of the component and areas tested
5. Test specification (AS1171-1998), test procedure, test restrictions
6. Product standard
7. Material type or specification
8. Surface condition - method of surface preparation
9. Test equipment and test media
10. Method of magnetization, current source and strength (if applicable)
11. Whether component de-magnetized or not
12. Results, descriptions and positions of all relevant discontinuities detected
13. Identity and signature of test personnel

MAX SCORE	SCORE ACHIEVED
1	
1	
1	
3	
2	
1	
1	
2	
4	
1	
1	
60	
2	
80	

TOTAL PART A

B. Final Report

1. The report has a method title
2. Laboratory name and address
3. Client's name and address
4. Identification of the component and areas tested
5. The product standard
6. The material type
7. The test specification (AS1171-1998)
8. Surface condition
9. Method of magnetization
10. Whether component de-magnetized or not
11. Test results
12. Date and place of test
13. Stage of examination
14. Identification and Qualification of Testing Officer
15. Signature of Authorised Officer

MAX SCORE	SCORE ACHIEVED
1	
1	
1	
1	
1	
1	
1	
1	
1	
1	
4	
1	
1	
2	
2	
20	

TOTAL PART B

TOTAL SCORE

MAX SCORE	SCORE ACHIEVED
100	

Overall Rating

Score 70 - 100 PASS

0 - 69 FAIL

This summary report should be read in conjunction with the final report found at www.pta.asn.au. The above

NOTE: results are from one proficiency program and may not be fully representative of a laboratory's overall performance. Therefore, this summary report should not be used solely to evaluate laboratory competence.

Date of issue:

End of Report
-----0000000-----