REPORT NO. 542

Magnetic Particle Inspection Proficiency Testing Program

May 2007

ACKNOWLEDGMENTS

PTA wishes to gratefully acknowledge the technical assistance provided for this program by Mr Jim Scott, ASC Pty Ltd, Mr Cliff Simmons, NATA, and Mr Ted Owen, formerly of BlueScope Steel. PTA would also like to thank Dr Gary Martin, ATTAR, who arranged for the supply of the test pieces used in this program.

PO Box 7507 Silverwater NSW 2128 AUSTRALIA

CONTENTS

1. FOREWORD

This report summarises the results of a proficiency testing program on the non-destructive test, magnetic particle inspection.

The testing program was conducted by Proficiency Testing Australia. The aim of the program was to assess laboratories' ability to competently perform the nominated tests.

2. FEATURES OF THE PROGRAM

(a) A total of 81 laboratories participated in the program. The circulation of the test pieces commenced on a regional state basis in December 2004 and was completed in December 2006. Laboratories from the following states and territories participated:

21	NSW
16	VIC
7	SA
2	TAS
21	QLD
1	NT
13	WA

To ensure confidential treatment of results, each laboratory was allocated a unique code number.

(b) A total of 6 test pieces were available for distribution to laboratories participating in this program.

(c) Each laboratory was supplied one test piece and was requested to test by the AC yoke magnetic flow technique. Inspection of the test piece was to be conducted in accordance with AS 1171: 1998.

(d) Laboratories were requested to perform their testing according to their copy of the *Instructions to Participants.* A copy of this document can be found in Appendix B.

(e) A job description was also sent to participants for each test piece. Copies of these documents can be found in Appendix C.

(f) A drawing, recording the non-compliant discontinuities, giving their type, dimension and location (reference to the specimen datum) was to be attached to the NATA endorsed report by the participants.

(g) The NATA endorsed report, as well as any laboratory work sheet(s), were to be submitted to Proficiency Testing Australia for assessment.

3. DESIGN OF THE PROGRAM

Participating laboratories were allocated one day to perform the testing on the supplied test piece.

The reported test results were assessed by the appointed technical advisers using the following criteria:

- Tolerance for sizing discontinuities was ± 2 mm. Half marks were awarded for sizing to ± 5 mm.
- Tolerance for positioning of discontinuities was ± 2 mm. Half marks were awarded for positioning to ± 5 mm.
- Certified discontinuities not found resulted in an automatic fail.
- Any non-existent discontinuities reported resulted in a loss of marks.
- Any defects not correctly identified (in accordance with AS 4749:2001 or AS 2812:1985) resulted in a loss of marks.
- Documentation was to conform to AS 1171:1998 and NATA requirements.

These criteria were then used to assess the laboratory reports using a pass/fail grading. The information was presented in the form of an interim report (see Appendix A).

4. TEST PIECE DETAILS AND PRE-TESTING

The test piece material used was carbon steel. The test piece configurations included plate butts, ‘T’ butts, ‘Y’ butts and pipes which contained weld and plate discontinuities. For further information on the test piece configurations, see Appendix C.

Details of the discontinuity types, lengths and locations for each test piece can be found in the Sonaspection Weld Test Specimen NDE Reports. See Appendix D for partial copies of these reports.

In November 2004, prior to the commencement of the proficiency testing program, each test piece was sent to BlueScope Steel for preliminary testing. This preliminary testing indicated that the test pieces were suitable for use in the program. The defects were determined to be appropriate, the surface condition was satisfactory and the test pieces were readily demagnetised.

5. ANALYSIS OF THE RESULTS

Failure Rates

The table below provides an analysis of the results by test piece. A total of 81 test results were submitted for evaluation, with 64 results graded as a pass and 17 results graded as a fail.

Table A: Failure Rates by Test Piece

Test Piece No.	Number Tested	Pass	Fail	Failure Rate
PL8394	12	7	5	42%
P8395	13	13	0	0%
P8396	13	11	2	15%
P8397	15	12	3	20%
T8398	14	11	3	21%
Y8399	14	10	4	29%
Total	81	64	17	21%

The analysis of the results showed that the plate PL8394 had the highest failure rate in relation to its use during the program. This test piece was used 12 times with 5 failures recorded (a failure rate of 42%). The test piece with the lowest failure rate was the pipe P8395. This test piece was used 13 times with no failures recorded.

Defect Lengths

The 6 test pieces contained a total of 21 defects. All except one were linear indications, either longitudinal or transverse. The non-linear indication was an area of surface porosity on one specimen.

Table B, on the next page, details the difference, in millimeters, between the individual measured lengths and the reference lengths. The reference tolerance on defect length was ±⅛” (3mm). Therefore, 262/278 x 100 = 94% of measured lengths were within the reference tolerance. (One extreme outlier was excluded from these results).

Overall, length measurement was generally satisfactory, taking into account that measurements were made with rulers graduated in millimeters.

Table B: Analysis of Defect Lengths by Test Piece

Test Piece No.	Difference Between Measured Lengths and Reference Lengths (mm)											
	0	1	2	3	4	5	6	7	8	9	10	11
PL8394	16	18	11	3	1	1	-	-	-	-	-	-
P8395	20	12	2	2	-	-	-	-	-	-	-	-
P8396	6	21	3	-	-	3	1	1	-	-	-	-
P8397	23	13	11	5	4	-	-	-	-	-	-	1
T8398	14	22	3	-	-	-	-	-	-	-	-	-
Y8399	23	22	7	5	-	2	1	-	-	-	1	-
Total	102	108	37	15	5	6	2	1	0	0	1	1

Defect Positions

The difference between individual measurements of defect positions and the positions stated on the reference reports is given in Table C, below. Again, an extreme outlier has been excluded.

Table C: Analysis of Defect Positions by Test Piece

Test Piece No.	Difference Between Measured Positions and Reference Positions (mm)									
	0	1	2	3	4	5	6	7	8	9
PL8394	15	19	10	1	2	1	2	-	-	-
P8395	4	15	12	2	1	2	-	-	-	-
P8396	7	7	13	5	2	-	1	-	1	-
P8397	12	28	6	1	6	3	-	1	-	-
T8398	19	15	4	1	-	-	-	-	-	2
Y8399	12	24	16	3	-	1	2	1	-	-
Total	69	108	61	13	11	7	5	2	1	2

From the above table, 251/279 x 100 = 90% of measured positions were within 3 mm or less from the reference positions.

Overall, position measurement was generally satisfactory.

Defect Classifications

The reference classifications for the defects are general (i.e. “HAZ” indication) and do not align with AS 4749: 2001 or AS 2812: 1985 Section 8 classifications (see Appendix D). Therefore, varied, but similar, descriptions were considered acceptable. Those considered to be misclassified were descriptions which were distinctly different to the reference descriptions. This then gave rise to the following table.

Table D: Analysis of Defect Classifications by Test Piece

Test Piece No.	Descriptions		
	Satisfactory	Misclassified	Not classified
PL8394	48	4	-
P8395	35	-	-
P8396	36	1	-
P8397	53	5	-
T8398	30	7	4
Y8399	52	12	-
Total	254	29	4

Therefore, 254/287 x 100% = 89% of classifications were appropriate.

Missed Defects

Defects were missed on 4 of the 6 test pieces. Overall, there were 11 instances of missed defects, the details being as follows:

Table E: Analysis of Missed Defects by Test Piece

Test Piece No.	No. of Missed Defects	Comments
PL8394	4	4 participants each missed one defect. 2 participants missed the same defect. This defect was oriented transversely. Testing for transverse defects may not have been performed, or the magnetic field may not have been sufficiently longitudinal to detect the transverse orientation.
P8395	0	-
P8396	2	Same defect missed.
P8397	2	Same defect missed.
T8398	3	Different defects. One participant missed 2 defects.
Y8399	0	-

False Calls

The results submitted by participants indicated that the degree of difficulty in interpretation varied between the test plates. In particular, the results for P8396 indicated that interpretation was not as straightforward as it was for other plates. On the other hand, PL8394 and T8398, having the least number of false calls, would be expected to have been easier to interpret between a reportable discontinuity and a false call.

As the notes accompanying the reference reports indicated that planar defects, which were not considered to be cracks, were not reportable (and therefore not identified on the reports) if their lengths were 10 mm or less, some of the false calls may have validity. Many of the false calls were less than 10 mm. The following table gives the numbers of false calls.

Table F: Analysis of False Calls by Test Piece

Test Piece No.	No. of False Calls	Comments
PL8394	5	1 participant - 5 false calls
P8395	10	6 participants 6 false calls were identified as being the same feature
P8396	32	10 participants 7 false calls - identical feature 4 false calls - identical feature 3 false calls - identical feature 2 false calls - identical feature (x 3)
P8397	13	6 participants 4 false calls - identical feature 2 false calls - identical feature
T8398	5	4 participants 2 false calls - identical feature
Y8399	14	4 participants 3 false calls - identical feature 2 false calls - identical feature

Reporting and Documentation

The interim report for this program detailed the requirements for the reports submitted by the participants (see Appendix A). If any requirement was not satisfied then the laboratory was not given the maximum score achievable for that category. Of the 81 results submitted for assessment, 65 (80%) were deficient of information required by AS 1171:1998 and NATA on the final report.

6. PTA AND TECHNICAL ADVISER'S COMMENTS

6.1 Reporting of Discontinuities

Failure of participants, due to non detection of a defect, was relatively low and, for these instances, it was most likely a result of the participant's omission to perform the specific test, e.g. not applying the field in the direction required to detect a transverse defect.

The most significant cause of a failure could be attributed to one or more of the following:

a) Failure to either read the instructions provided or the requirements were ignored.
b) Failure to record specific information on work sheets.
c) Failure to record accurately some information on work sheets.
d) Providing ambiguous, conflicting or inaccurate information relating to defect location.
e) Providing no statement of compliance / non compliance.

6.2 Reporting and Documentation

Some of the reports issued by the laboratories that participated in the program did not adequately address the reporting requirements specified by NATA or the Industry Standard.

The number of reports that were deficient of information indicates that there is room for improvement in this area. Individual laboratories, and the NDT industry in general, need to consider reporting standardisation and simplification and put greater emphasis and importance on report details and terminology.

6.3 General Comments

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 must raise concerns regarding the technical control of those laboratories.

The overall failure rate of 21% for this program indicates that there is room for improvement in the application of the magnetic particle test method.

7. REFERENCES

1. *AS 1171:1998 Non-destructive testing – Magnetic particle testing of ferromagnetic products, components and structures.*

2. *AS 1210:1997 Pressure vessels.*

3. *AS 2812:1985 Welding, brazing and cutting of metals – Glossary of terms.*

4. *AS 4037:1999 Pressure equipment – Examination and testing.*

5. *AS 4749:2001 Non-destructive testing – Terminology of and abbreviations for fusion weld imperfections as revealed by radiography.*

6. *Guide to Proficiency Testing Australia* (2006). (This document is located on the PTA website at www.pta.asn.au, under “Documents”).

APPENDIX A

Interim Report
and
Scoring Criteria

PROFICIENCY TESTING AUSTRALIA
MAGNETIC PARTICLE INSPECTION PROGRAM
INTERIM REPORT

LABORATORY :
NATA ACCREDITATION No. :
NATA SITE No. :
PTA CODE No. :
TEST PIECE ID :
LABORATORY REPORT No. :

SYSTEM OF SCORING
* Refer to scoring criteria for total allocation of marks for these catagories.

A. Work Sheets	MAX SCORE	SCORE ACHIEVED
1. Name of laboratory	1	
2. Report No.	1	
3. Date and place of test	1 *	
4. Identification of the component	3 *	
5. Test specification (AS1171-1998) and test procedure	2 *	
6. Product standard (AS1210)	1	
7. Material type or specification	1	
8. Areas tested (may be included in item 4. Above)		
9. Surface condition - method of surface preparation	2 *	
10. Test equipment and test media	4 *	
11. Method of magnetization, current source and strength (if applicable)	1	
12. Whether component de-magnetized or not	1	
13. Results, including location of all relavent discontinuities	60 *	
14. Identity and signature of test personnel	1	
15. Type of permanent record made	1	
TOTAL	**80**	

B. Final Report	MAX SCORE	SCORE ACHIEVED
1. The report has a method title	1	
2. Laboratory name and address	1 *	
3. Clients name and address	1 *	
4. Identification of the component	1 *	
5. The product standard (AS1210)	1	
6. The material type	1	
7. The test specification (AS1171-1998)	1	
8. Areas tested (may be included in item 4. Above)		
9. Surface condition	1	
10. Method of magnetization	1	
11. Whether component demagnetized or not	1	
12. Test results	4 *	
13. Date and place of test	1 *	
14. Pagination	1 *	
15. Identification of test technician	1	
16. Identification and signature of NATA signatory / delegated signatory	2 *	
17. A correct form of the NATA endorsement	1	
TOTAL	**20**	
TOTAL Part A	80	
TOTAL SCORE	**100**	

Overall Rating

Score	70 - 100	PASS	☐
	0 - 69	FAIL	☐

A2

Scoring Criteria

Section A

3	Either date or place missing = 0
4	Description of component only = 1 Includes area tested = 2 Total= 3
5	Test specification = 1 Test procedure = 1 Total= 2
9	If weld and HAZ plate surface adequately defined = 1, if method of surface preparation defined = 1 Total= 2
10	Manufacturer and product type for all consumables used = 2, either missing = 1 Serial No of magnet = 2 Total= 4
13	All defects found = 20 (any defect not found = overall FAIL) All defects correctly identified = 15 (in accordance with AS4749 or AS2812) All defects correctly sized to + or - 2.0mm = 10, to + or - 5.0mm = 5, to + or - 6.0mm or greater = 0 (this accuracy is based on using a ruler graduated in mm) All defects correctly located on a sketch to + or - 2.0mm = 10, to + or - 5.0mm = 5, to + or - 6.0mm or greater = 0 Any false calls = -10 Correct PASS / FAIL call to product standard = 5 Total= 60

Section B

2	Either name or address missing = 1
3	Either clients name or address missing = 1
4	Description of component and area tested = 1, either missing = 0
12	All defects reported = 1 All defects correctly identified = 1 All defects correctly sized = 1 All defects correctly located on the sketch = 1 Total= 4
13	Either date or place missing = 1
14	Any attachment page without report No. and page No. = 0
16	Either identification or signature missing = 0

Note :
The emphasis has been placed on the worksheet as this is where all the technical details should be recorded. The final report is, in most establishments, a typed copy of the worksheet without some of the technical detail. Also most establishments use pre-formatted worksheets and final reports (which will have been accepted by NATA via routine audits), therefore information other than the results is usually given to the technician who is prompted by the box to record this information.

APPENDIX B

Instructions to Participants

PROFICIENCY TESTING AUSTRALIA

MAGNETIC PARTICLE INSPECTION PROGRAM – 2006

INSTRUCTIONS TO PARTICIPANTS

Participants are requested to note the following before commencing their testing.

1. General

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

ii) The magnetic particle test should be considered as a typical work situation and, as such, all normal recording and reporting requirements shall apply.

iii) Relevant discontinuities only are to be recorded on an appropriate drawing, which is to be provided as part of the work sheet. Discontinuities shall be identified as defined in AS 4749 – 2001 or AS 2812 – 1985 section 8.

2. Test Method

i) The test specimen is to be tested using AC yoke magnetic flow technique.

ii) Non-fluorescent, wet test media shall be used.

iii) Inspection of the test specimen is to be conducted in accordance with AS 1171 – 1998.

iv) Any discontinuities recorded from the test shall be assessed for compliance with AS 1210 Class 1.

3. Recording and Reporting

i) On an appropriate drawing, record non-compliant discontinuities, giving their type, dimension and location (reference to the specimen datum). This copy shall be attached to the NATA endorsed report.

ii) A NATA endorsed report and the laboratory work sheet(s) shall be submitted to Proficiency Testing Australia (PTA).

Note:

PTA expects the work sheet(s) and final report for this proficiency test to meet the same standard required of any other job, for which your laboratory issues a NATA endorsed report. The majority of marks will be awarded for information provided in the work sheet(s). Providing a drawing with all the defects correctly identified, on its own will not score a pass.

4. Return of Test Specimen and Results

i) The test specimen is to be thoroughly cleaned on completion of the test.

ii) Please determine whether the test specimen has any significant residual magnetism after completing the test and, if so, perform one of the de-magnetisation procedures identified in AS 1171 before returning the test specimen to PTA.

ii) The test specimen, together with completed NATA endorsed report and laboratory work sheet(s) are to be returned the day after receipt to:

Mark Bunt
Proficiency Testing Australia
7 Leeds Street
RHODES NSW 2138

Phone: 02 9736 8397 (1300 782 867)
Facsimile: 02 9743 6664

APPENDIX C

Job Descriptions

C1

PL 8394

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test plate PL 8394.
Description:	Single V butt pressure vessel weld in carbon steel plate, grade AS 1548-7-460R, 10 mm thickness.
Application Standard:	Longitudinal butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The plate surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

C2

P 8395

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test pipe P 8395.
Description:	Single V circumferential butt weld in carbon steel, grade AS 1835, pressure piping, 10 mm thickness, 60 mm nominal bore.
Application Standard:	Circumferential butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The pipe surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

C3

P 8396

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test pipe P 8396.
Description:	Single V circumferential butt weld in carbon steel, grade AS 1835, pressure piping, 10 mm thickness, 135 mm nominal bore.
Application Standard:	Circumferential butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The pipe surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

C4

P 8397

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test pipe P 8397.
Description:	Single V circumferential butt weld in carbon steel, grade AS 1835, pressure piping, 10 mm thickness, 185 mm nominal bore.
Application Standard:	Circumferential butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The pipe surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

C5

T 8398

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test plate T 8398.
Description:	Single bevel T butt pressure vessel attachment weld in carbon steel plates, grade AS 1548-7-460R, 10 mm thicknesses.
Application Standard:	Longitudinal T butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The plate surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

C6

Y 8399

The information provided below is based on the requirements of AS1171, Appendix A2 – “Information to be supplied by the Purchaser”.

Identification:	PTA test plate Y 8399.
Description:	Single bevel Y butt pressure vessel attachment weld in carbon steel plates, grade AS 1548-7-460R, 10 mm thicknesses.
Application Standard:	Longitudinal Y butt weld constructed to AS 1210, Class 1 (AS 4037).
Manufacturing History:	As welded, MMAW, preheated to 110º C using gas torch, no post heat treatment applied.
Surface Condition:	The plate surface is in the coarsely sanded condition and the weld surface is as welded – both surfaces are clean and free of foreign material.
Test Method:	AS 1171 – Magnetic flow non-fluorescent (ink) method required.
Acceptance Standard:	AS 4037.
Demagnetization:	*Yes,* if significant residual magnetism remains.
Corrosion Preventative:	Not required.
Test Report:	A NATA endorsed test report is required.
Test Area:	Fully examine the weld zone – note any areas not accessible as a test restriction.
Defects Sought:	Test the weld zone for any surface defects which do not comply with AS 4037.
Required Departures from test methods in AS 1171:	NONE.

APPENDIX D

Sonaspection
Weld Test Specimen
NDE Reports

D1

sonaspection

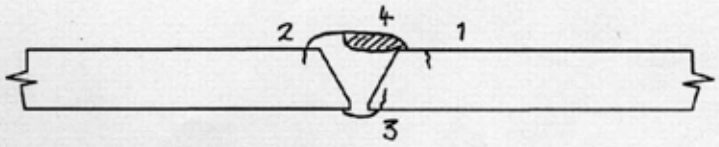
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	10.12.03.
Specimen ID	PL 8394		Specimen Type	Plate
Dimensions	300 x 10	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	HAZ Indication	27	136	
2	Toe Indication	12	210	
3	Root Indication	19	216	
4	Transverse Indication	9	270	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed

sonaspection

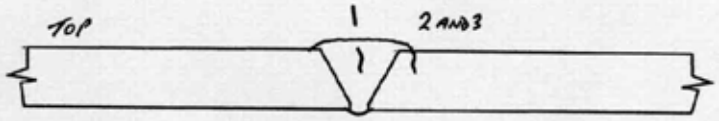
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	10.12.03.
Specimen ID	P 8395		Specimen Type	Pipe
Dimensions	Dia 80 x 10 x 300	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	Centre Line Indication	13	15	
2	Toe Indication	13	45	
3	Toe Indication	17	144	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed

SONASPECTION INTERNATIONAL LTD.

sonaspection

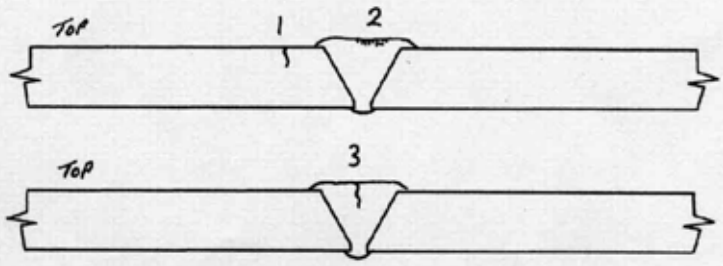
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	17.12.03.
Specimen ID	P 8396		Specimen Type	Pipe
Dimensions	Dia 150 x 10 x 300	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	HAZ Indication	13	83	
2	Surface Porosity	18	193	
3	Centre Line Indication	19	380	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed

D4

sonaspection

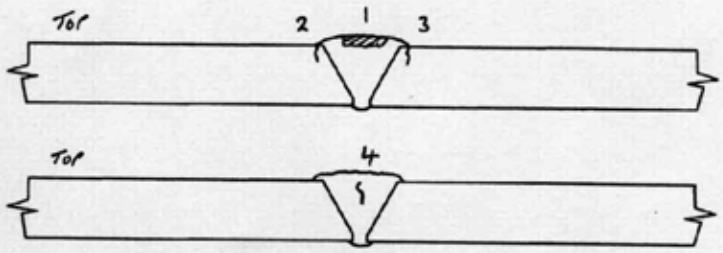
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	10.12.03.
Specimen ID	P 8397		Specimen Type	Pipe
Dimensions	Dia 200 x 10 x 300	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	Transverse Indication	18	51	
2	Toe Indication	27	194	
3	Toe Indication	19	274	
4	Centre Line Indication	10	405	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed

sonaspection

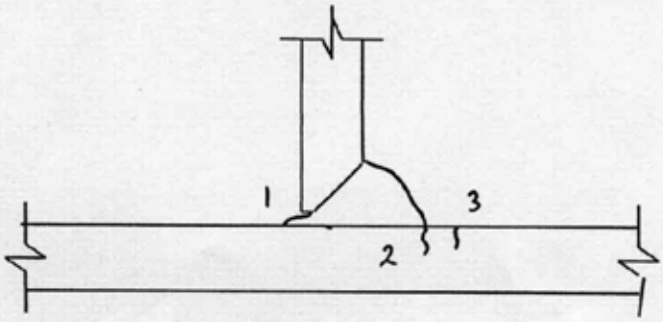
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	10.12.03.
Specimen ID	T 8398		Specimen Type	Tee
Dimensions	300 x 10	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	Lack of Root Fusion	16	32	
2	Toe Indication	13.50	164	
3	HAZ Indication	13	220	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed

sonaspection

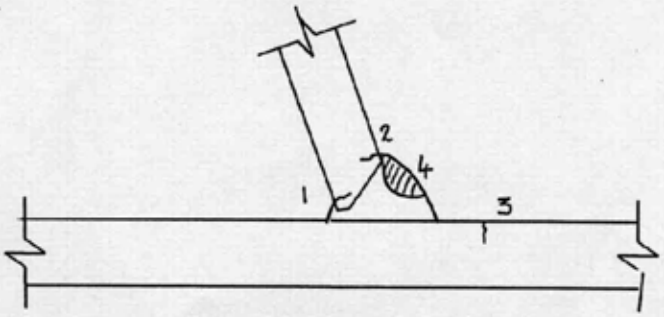
'Quality Flaws Assured'

NDE INSPECTION REPORT

Magnetic Particle

Customer	ATTAR		Date	10.12.03.
Specimen ID	Y 8399		Specimen Type	Y
Dimensions	300 x 10	mm	Acceptance Spec.	SI/08/88

Weld Cross Section(s):-



Flaw No	Flaw Type	Flaw Length mm	Distance from 0 mm	Remarks
1	Root Indication	20	23	
2	Toe Indication	15	85	
3	HAZ Indication	27	243	
4	Transverse Indication	9	279	

ALL DIMENSIONS IN MM

Comments

Inspector	Neil Kelly	Signed