Document No : UniKL MFI_SD_AC41 Revision No: 02 Effective Date: 01 December 2008



SET A

UNIVERSITI KUALA LUMPUR Malaysia France Institute

FINAL EXAMINATION SEPTEMBER 2014 SESSION

SUBJECT CODE : FWB24103

SUBJECT TITLE : WELD INSPECTION TECHNIQUE

LEVEL : BACHELOR

TIME / DURATION : 8.00 PM - 10.30 PM

(2.5 HOURS)

DATE : 9 JANUARY 2015

INSTRUCTIONS TO CANDIDATES

- 1. Please read the instructions given in the question paper CAREFULLY.
- 2. This question paper is printed on both sides of the paper.
- 3. Please write your answers on the answer booklet provided.
- 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
- 5. This question paper consists of TWO (2) sections. Answer all questions in Section A and Section B.
- 6. The ISO 5817 standard will be provided and should be returned after the exam.
- 7. Answer all questions in English.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answers All Questions.

Questions 1

Destructive testing is an important activity in identifying weld integrity:

1.1 Explain what you know about "destructive testing".

(7 marks)

1.2 Why is Destructive Testing important?

(8 marks)

Questions 2

Non destructive testing is an important activity in identifying weld integrity:

2.1 Explain what you know about "non-destructive testing".

(7 marks)

2.2 Why is non destructive testing important?

(8 marks)

Questions 3

In **Liquid (Dye) Penetrant testing**, you will come across the term "**Dwell time**". What is it? (10 marks)

SECTION B (Total: 60 marks)

ANSWER ALL QUESTIONS. Use Appendices 2 & 3 to Answer Questions 3 & 4 in Section B.

Question 1

Liquid dye penetrant testing is a non destructive testing method:

1.1 Explain briefly about "Liquid (Dye) Penetrant Testing (PT)" and

(5 marks)

1.2 What are its main purpose, importance and limitations?

(5 marks)

Question 2

Mechanical testing is used to identify weld integrity:

2.1 Explain briefly about the "Root and Side Bend Tests" and

(5 marks)

2.2 What are its main purpose, importance and limitations?

(5 marks)

Question 3

Appendix 1 below shows a photo of a "Macro Sample ID AM1034". It is a 10X magnification from the actual sample.

- 3.1 Identify visible defects/imperfections on the macro sample and plot in the Macro report sheet in **Appendix 2**.
- 3.2 Number the defects/imperfections found in the Macro sample on the macro report sheet in **Appendix 2**.
- 3.3 Measure and size the defects/imperfections found on the Macro report sheet in **Appendix 2.**
- 3.4 Sentence the defects/imperfections in accordance to **ISO 5817 (Stringent)**. The ISO 5817 is provided.
- 3.5 A comment on the defects/imperfections and on the condition of the specimen is imperative.

(20 marks)

Question 4

Photo 1 below shows a Tee Joint specimen with a single sided fillet weld. Please read carefully the instructions below in order to conduct the visual inspection as per **Appendix 1** and to comply with the **ISO 5817 requirement**.



Photo 1 - Tee Fillet Joint

General Information:-

(a) Specimen No.: FW122

(b) Material Type: carbon manganese steel(c) Material Thickness: 12.0 mm X 300 mm

(d) Material size: 100 mm X 300 mm

(e) Welding process: 111(f) Welding position: PB

Weld Information:

- (a) Vertical plate maximum weld height measured:12.0 mm
- (b) Vertical plate minimum weld height measured: 9.0 mm
- (c) Horizontal plate maximum weld height measured: 10.0 mm
- (d) Horizontal plate minimum weld height measured: 9.5 mm
- (e) Throat maximum weld depth measured: 9.5 mm
- (f) Throat minimum weld depth measured: 8.0 mm

Information on Defects/Imperfections:

- (a) Toe undercut: 1.5 mm D X 50.0 mm L
- (b) Poor stop start (Overlap): 2.5 mm D X 20.0 mm L
- (c) Crater depression: 1.0 mm D X 15.0 mm L
- (d) Grinding marks: Area 30.0 mm X 30.0 mm
- (e) Chipping marks: Area 30.0 mm X 30.0 mm
- (f) Stray arc: Area 25.0 mm X 30.0 mm
- (g) Stray arc: Area 30.0 mm X 20.0 mm
- (h) Surface Porosity: Area 10.0 mm X 10.0 mm
- (i) Slag: 1.0 mm D X 10 mm L
- (j) Spatter: Area 20.0 X 20.0 mm
- (k) Scales: Area 15.0 mm X 30.0 mm

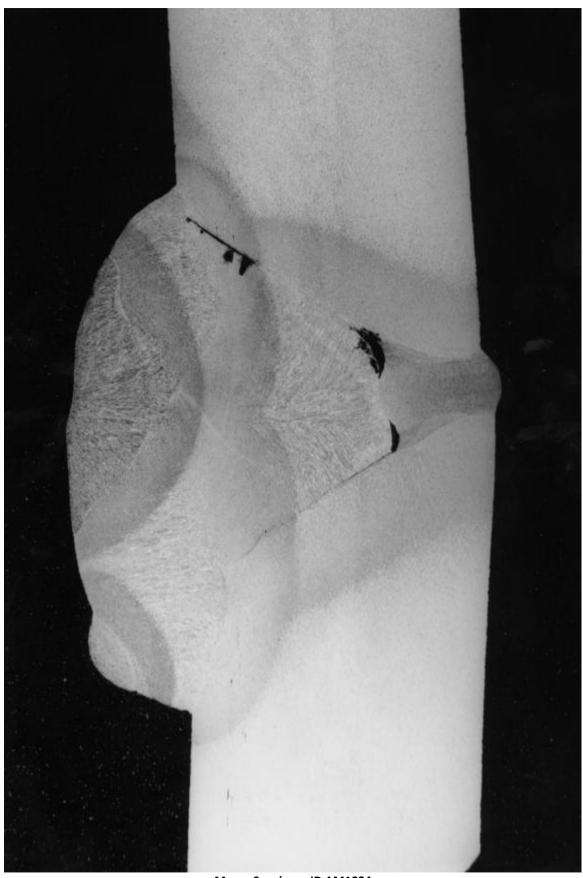
By using Appendix 3, your tasks shall be to identify the following:-

- 4.1 Measure and record as required in **Appendix 3**;
- 4.2 Sentence the fillet weld dimensions in accordance to the design criteria as required in Appendix 3;
- 4.3 Report the defects/imperfections as required in **Appendix 3**;
- 4.4 Record defects/imperfections according to its length, depth and height as required in **Appendix 3**;
- 4.5 Sentencing of all visible defects should be in accordance to **ISO 5817 "Moderate"** category (provided);
- 4.6 Your overall assessment as required in **Appendix 3**;
- 4.7 Sign and print your name as required in **Appendix 3**;
- 4.8 Your remarks and recommendations as required in **Appendix 3.**

(20 marks)

END OF QUESTION

Appendix 1



Macro Specimen ID AM1034

Appendix 2

ACCEPT/REJECT

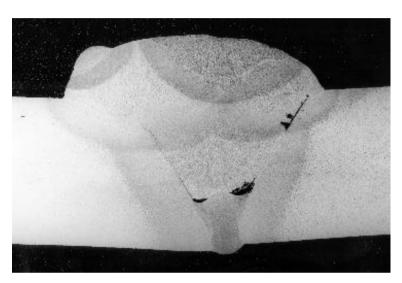
MACRO INSTRUCTION/REPORT SHEET [ID: AM1034]

CHECK PHOTOGRAPH ID MATCHES THIS REPORT ID

ALL DEFECTS TO BE REPORTED [AND SIZED IF REQUIRED]

THEN SENTENCED TO ISO 5817 LEVEL B [STRINGENT]

NOTE: PHOTOGRAPH IS AT X10 MAGNIFICATION
MATERIAL: LOW CARBON MANGANESE STEEL
WELDING PROCESS: [MMA/SMAW/111]



SIZE

DEFECT

1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11	Excess weld metal					
12	Excess penetration					
Comments:						
Signature: Date:						
Print Full Name:						

No.

Appendix 3

Fillet Welded Joint

DEFECTS TO BE SENTENCED USING ISO 5817 "LEVEL D" (MODERATE) WELD SIZE SENTENCED USING "DESIGN CRITERIA"

Specimen No.:					Material thickness:	
1.	Measure and record the following details:-					
	VERTICAL LEG LENGTH	(Max & Min)	Max m	nm	Min mm	
	HORIZAONTAL LEG LENGTH	(Max & Min)	Max m	nm	Min mm	
	DESIGN THROAT THICKNESS	(Max & Min)	Max m	nm	Min mm	
2. Sentence the fillet weld dimensions using the following design criteria:-						
	MINIMUM LEG LENGTH:	Material Thickness	s			
	MAXIMUM LEG LENGTH:	Material Thickness	s + 3.0 mm			
	MINIMUM THROAT THICKNESS:	Material Thickness	s X 0.7 mm			
	MAXIMUM THROAT THICKNESS:	Material Thickness	s + 0.5 mm			
	The VERTICAL LEG LENGTH		ACCEPT	OR	REJECT	
	Please state:					
	The HORIZONTAL LEG LENGTH		ACCEPT	OR	REJECT	
	Please state:					
	The THROAT THICKNESS:		ACCEPT	OR	REJECT	
	Please state:					
3.	3. Report the defects/imperfections for the following, how many places:-					
	UNDERCUT APPEAR?					
	OVERLAP APPEARS?					
	LACK OF FUSION APPEARS?					
	CRACKS APPEAR?					
	POROSITY APPEARS?					
	SOLID INCLUSIONS APPEAR?					
	Misc. (ARC STRIKES, etc.)					

4.	For defects recorded – state the MAXIMUM length (and Di	EPTH if applicable) of each defect:-					
	UNDERCUT APPEAR?	Length: mm	Depth: mm				
	OVERLAP APPEARS?	Length: mm	Depth: mm				
	LACK OF FUSION APPEARS?	Length: mm	Depth: mm				
	CRACKS APPEAR?	Length: mm	Depth: mm				
	POROSITY APPEARS?	Length: mm	Depth: mm				
	SOLID INCLUSIONS APPEAR?	Length: mm	Depth: mm				
	Misc. (ARC STRIKES, etc.)	Length: mm	Depth: mm				
5.	5. Sentence the defects recorded using ISO 5817 "Level D" (Moderate):-						
	UNDERCUT APPEAR?		ACCEPT or REJECT?				
	OVERLAP APPEARS?		ACCEPT or REJECT?				
	LACK OF FUSION APPEARS?		ACCEPT or REJECT?				
	CRACKS APPEAR?		ACCEPT or REJECT?				
	POROSITY APPEARS?		ACCEPT or REJECT?				
	SOLID INCLUSIONS APPEAR?		ACCEPT or REJECT?				
	Misc. (ARC STRIKES, etc.)		ACCEPT or REJECT?				
6.	Your overall assessment.						
	IS THE WELD ACCEPTABLE?		YES or NO				
	SIGNATURE:						
	PRINT FULL NAME:						
	DATE:						
7.	REMARKS & RECOMMENDATIONS:						