

Department of Education
SPTVE
Shielded Metal Arc Welding
(SMAW) 9
Welding Procedure Specification (WPS)
Quarter 2: Week 7 Module



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EXPECTATIONS

At the end of the module, you should be able to:

1. define the meaning of Welding Procedure Specification;
2. explain how Welding Procedure Qualification Record and Welder performance Qualification supports Welding Procedure Specification; and
3. understand the importance of Welding Procedure Specification to perform welding operation.



PRE-TEST

Directions: Read the statements carefully and choose the letter of the correct answer. Write your answer in a separate sheet of paper.

1. It is a formal written document describing standard welding procedures.

A. WPQ	C. WPQR
B. WPS	D. WPSR
2. What does WPQR means?

A. Welder Procedure Quality Record
B. Welding Performance Quality Record
C. Welding Procedure Qualification Record
D. Welding Performance Qualification Record
3. What does WPQ means?

A. Welder Procedure Quality
B. Welder Performance Quality
C. Welding Procedure Qualification
D. Welder Performance Qualification
4. It is a document that required by all codes for all welders.

A. WPQ	C. WPQR
B. WPS	D. WPSR
5. What does WPS means?

A. Welding Procedure Specification
B. Welding Procedure Specialization
C. Welder Performance Specification
D. Welding Performance Specialization

6. In WPQ, the following information are needed. Which is not included?
- A. welder's name
 - B. results of qualification tests
 - C. electrode specifications data
 - D. Welders qualification records
7. This document combines all the information of the WPS and adds the test results to provide a complete document that certifies the welding specification.
- A. WPQ
 - B. WPS
 - C. WPQR
 - D. WPSR
8. In WPQR, the following supporting documents are needed except:
- A. material specification
 - B. welder qualification test
 - C. shielding gas specification
 - D. welder's performance qualification
9. If your company uses a weld that does not have a WPS, what will you do?
- A. Do nothing.
 - B. Pretend you know WPS.
 - C. Create a WPS even its your first time.
 - D. Create a WPS if you have experienced in writing WPS.
10. In WPS, the following are needed information, except:
- A. clock number
 - B. techniques to employ
 - C. materials and tools required
 - D. full task specifications



LOOKING BACK

Directions: Read the statements carefully and identify the welding defects described below. Use separate paper for your answer sheet.

- _____ 1. It is most common defects and they can occur anywhere on the surface of the weld material.
- _____ 2. The weld pool overflows on the surface of the weld metal.
- _____ 3. It occurs in the use of electron beam welding where the weld does not penetrate properly.
- _____ 4. The metal particles from the weld is stuck on the area adjacent to the weld area.
- _____ 5. Gases or air bubbles that are trapped in the weld metal.



BRIEF INTRODUCTION

A **Welding Procedure Specification**, or WPS, is a formal written document describing standard welding procedures. These procedures provide clear direction for your welders to make quality products that are up to code and industry standards. They will include any details and information that are required to make a desired weld. These are proven and tested procedures that include but are not limited to, information such as the materials needed, the tools required, the processes to follow, the techniques to employ and finally confirmation of the desired outcome.

A Welding Procedure Specification is essential for every welding company to have because it maintains quality standards across every weld.

Under various Australian and international standards (eg.ISO 15612, ISO 15609), a WPS is required to ensure a stable weld.

Under the Work Health and Safety Act of 2011, business owners have an obligation and duty of care to construct and operate a safe plant. For compliance to the Act, welders need to ensure they are following correctly designed WPS. If your company uses a weld that does not have a WPS, it is your obligation to create one. But you must be a welding engineer or any knowledgeable and competent person in the welding metallurgy with appropriate experience can write a WPS.

WPS is supported by a Welding Procedure Qualification Record (WPQR) and Welder Performance Qualification (WPQ).

The **Welding Procedure Qualification Record** is the document that qualifies the Welding Procedure Specification. To qualify your WPS, a procedure qualification plate is welded the code requirements. The actual test parameters are recorded at the time of welding to ensure the WPS was being followed. Generally, any supporting documentation, such as material specifications, electrode specifications and

shielding gas specifications, are included as part of the WPQR. All required testing, both non-destructive and destructive, is recorded as well. These tests typically include X-Ray examinations, ultrasonic examinations, tensile testing, bend testing and when required impact testing.

The WPQR combines all the information of the WPS and adds the test results to provide a complete document that certifies the welding specification. This document is also required by all codes unless you are qualifying under American Welding Society (AWS) specifications. Under certain conditions the WPS may be considered prequalified in which the WPQR is not required.

The **Welder Performance Qualification** is a document that required by all codes for all welders. It details and summarizes the following information: indicates the WPS referenced during the qualification test, identifies the welder by name and/or clock number, lists what the essential parameters were during this test, reports the results of the required qualification tests, specifies qualified limits for welder, and for most codes there is a time limit associated with the welder qualification test.

However, the American Welding Society provides an unlimited qualification period if certain conditions are met. As with the WPS and WPQR, each code has a recommended format.

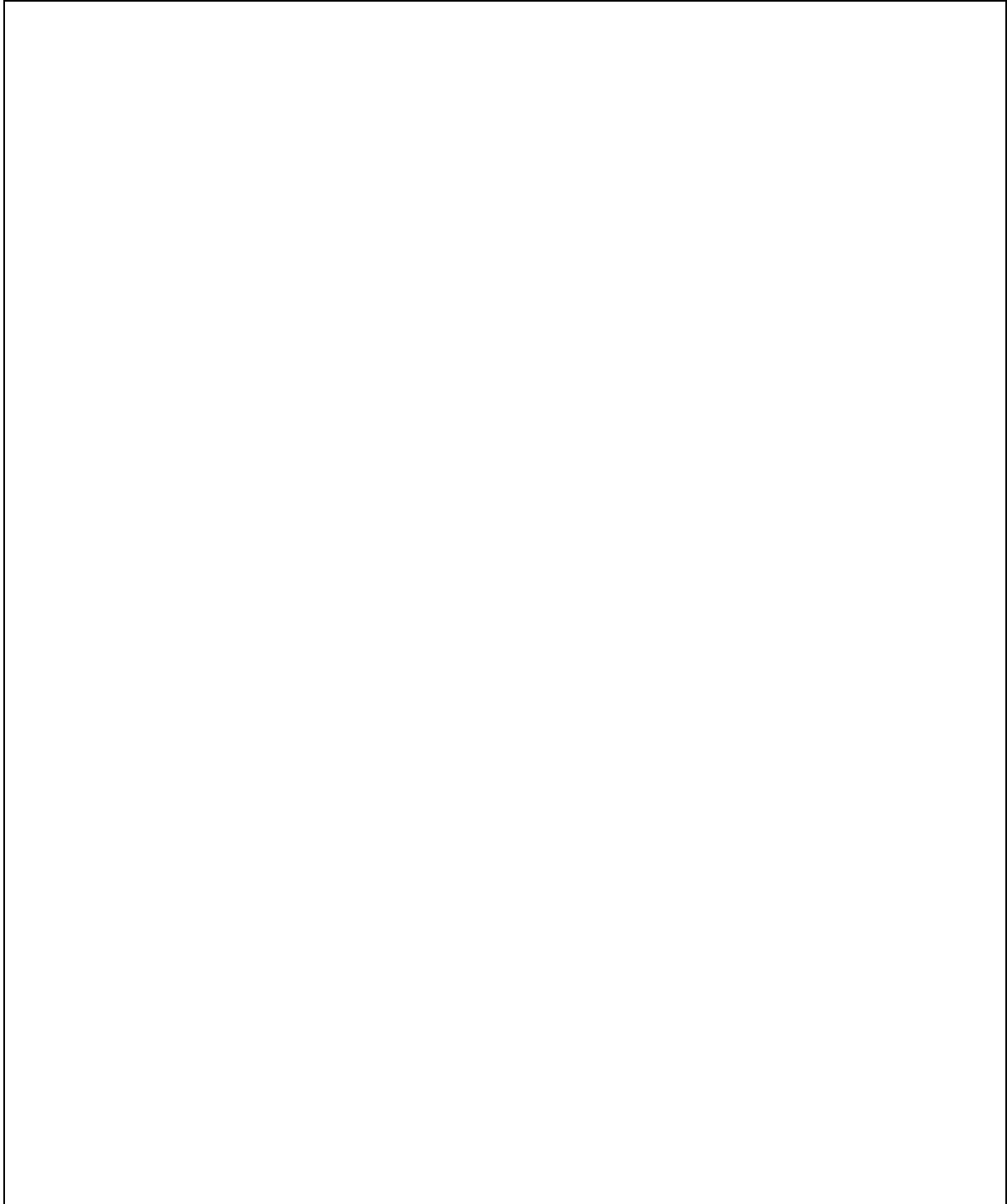


ACTIVITIES

A. Directions: Watch the video “How to Write Welding Procedures” on youtube (<https://www.youtube.com/watch?v=ACHOxjK-RtA>).

List the steps on how to write welding procedures. Use a separate sheet of paper for your answer.

B. Directions: How do you define Welding Procedure Specification?
Create a poster that shows the meaning of Welding Procedure Specification.
Use bond paper for your drawing.

A large, empty rectangular box with a thin black border, intended for a student to draw a poster. The box occupies the majority of the page below the instructions.



REMEMBER

- The Welding Procedure Specification is a required document for all code welding. Your customer either directly or indirectly specifies to what code your company must qualify. The WPS outlines all the parameters required to perform your welding operation.
- In short, the WPS is the recipe for your welding operation. It describes the welding process or processes used, the base materials used, the joint design and geometry, gases and flow rates, welding position and includes all the process conditions and variables. Each code has a recommended format.
- All WPSs start with a WPQR. It is a record of the test. It DOES NOT have any ranges. It lists the actual values recorded during the welding of a test piece. It proves the welding process. Then using the essential variables (ranges) from the relevant code/standard a WPS can be generated from this record of actual values.
- WPQR is essentially the 'actual' method that is used to create and test the welds to ensure they meet all applicable requirements.
- The test procedures and final results are documented in the WPQR. If the WPQR meets the set standards of the welding world, then it will serve as the foundation on which one or more WPSs are drafted.
- WPQ is used to test the actual welder. Is the welder able to produce a sound weld;
 - With a particular welding process ie. SMAW
 - In a given position Horizontal, Vertical or Overhead
 - On a particular joint configuration Butt weld or Fillet weld.
- A Welder Performance Qualification is recorded on documentation known as a test certificate that details the ranges that welder is qualified. Ranges or essential variables for WPQ are not always the same as those for a WPS. An example would be that is a welder can weld in the overhead position (more difficult) it is logical they be qualified in the flat position (less difficult).The welder completes a test coupon under supervision following a WPS. The weld is then tested using the method prescribed in the relevant standard.



CHECK YOUR UNDERSTANDING

A. Directions: Write a reflection about the importance of Welding Procedure Specification to perform welding operation. Use a separate paper for your answer.

B. Directions: Read the statement carefully and choose your answer from the box. Write the letter of the correct answer. Use separate paper for your answer.

1. _____ provide clear direction for your welders to make quality products that are up to code and industry standards.
2. A Welding Procedure Specification is essential for every welding company to have because it maintains _____.
3. Under the _____, business owners have an obligation and duty of care to construct and operate a safe plant.
4. In _____, tests typically includes are X-Ray examinations, ultrasonic examinations, tensile testing, bend testing and when required impact testing.
5. In WPQR, _____ test are recorded as well.
6. Under certain conditions the WPS may be considered _____ in which the WPQR is not required.
7. The test procedures and _____ are documented in the WPQR.
8. The _____ provides an unlimited qualification period if certain conditions are met.
9. WPQR is required by all codes unless you are qualifying under - _____ specifications.
10. Under _____, a WPS is required to ensure a stable weld.

- | | |
|---|----------------------|
| A. Work Health and Safety Act of 2011 | G. WPQR |
| B. American Welding Society | H. WPS |
| C. non-destructive and destructive | I. final results |
| D. prequalified | J. quality standards |
| E. American Welding Society (AWS) | K. WPQ |
| F. Australian and international standards | L. qualified |



POST TEST

Directions: Read the statements carefully and choose the letter of the correct answer. Write your answer in a separate sheet of paper.

1. If your company uses a weld that does not have a WPS, what will you do?
 - A. Do nothing.
 - B. Pretend you know WPS.
 - C. Create a WPS even its your first time.
 - D. Create a WPS if you have experienced in writing WPS.
2. In WPS, the following are needed information, except:
 - A. clock number
 - B. techniques to employ
 - C. materials and tools required
 - D. full task specifications
3. This document combines all the information of the WPS and adds the test results to provide a complete document that certifies the welding specification.
 - A. WPQ
 - B. WPS
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4. In WPQR, the following supporting documents are needed except:
 - A. material specification
 - B. welder qualification test
 - C. shielding gas specification
 - D. welder's performance qualification
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8. It is a document that required by all codes for all welders.
- | | |
|--------|---------|
| A. WPQ | C. WPQR |
| B. WPS | D. WPSR |
9. What does WPS means?
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 - B. Welding Procedure Specialization
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 - D. Welders qualification records

REFERENCES:

Public Technical Vocational Schools, COMPETENCY-BASED LEARNING MATERIAL, Third Year, Shielded Metal Arc Welding [Department of Education 2008]

Welding Technology, 2nd Edition, Gower A. Kennedy

Welding Guide Fabrication Shop, Ismael V. Palabrica

Metal Works 1, SEDP Series, Industrial Technology

Basic Manual Metal Arc Welding, National Training Center for Technical Education and Staff Development

Welding Principles and Applications, Larry Jeffus and Harold V. Johnson

Posttest
 1. D
 2. A
 3. C
 4. C
 5. B
 6. C
 7. D
 8. A
 9. A
 10. C

Key to Correction:

Pretest
 1. B
 2. C
 3. D
 4. A
 5. A
 6. C
 7. C
 8. C
 9. D
 10. A