

**Department of Education**  
**SPTVE**  
**SHIELDED METAL ARC**  
**WELDING (SMAW)10**  
**Conduct Visual Inspection**  
**Quarter 2: Week 6 Module**



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## EXPECTATIONS

At the end of the lesson, the learner is expected to:

1. conduct visual inspection on finished weldment in accordance with existing welding standards,
2. enumerate the important items to be reviewed, checked and considered in conducting visual inspection, and
3. differentiate the methods in conducting visual inspection.



## PRE-TEST

**Directions:** Label these events of visual inspection, if it is done **BEFORE, DURING, or AFTER** welding.

- \_\_\_\_\_ 1) All welds are inspected for weld defect.
- \_\_\_\_\_ 2) Determine that pre heat requirements are adhered at the time of welding.
- \_\_\_\_\_ 3) Determine designated electrode for the base metal.
- \_\_\_\_\_ 4) Check all applicable drawings, specifications, procedures, and welder's qualifications.
- \_\_\_\_\_ 5) Materials specification of parts comprising the weldment to determine if it follows required specifications.
- \_\_\_\_\_ 6) Size of all welds are checked using appropriate weld gauges.
- \_\_\_\_\_ 7) Compare weld preparation of each joint with the drawings.
- \_\_\_\_\_ 8) Check assembly dimension and fit up.
- \_\_\_\_\_ 9) Determine that correct welding current and proper polarity are being used.
- \_\_\_\_\_ 10) Determine that interpass cleaning by chipping, grinding, and gouging are being done in accordance with procedures.



## LOOKING BACK

Before you start with the new lesson, let us find out if you still remember our past lesson on multi layer weld in flat position. In the box below, arrange the welding procedures of multi layer fillet weld.

**Directions:** Arrange the welding procedures of multi layer fillet weld in flat position. Write 1 on the blank the first procedure, 2 for the second procedure and 3 to 11 for the succeeding procedure.

- \_\_\_\_\_ Prepare the tools, equipment and materials needed.
- \_\_\_\_\_ Strike the arc at the starting point and hold the rod at correct angles then shorten the arc at the finishing points and fill the crater with molten metal.
- \_\_\_\_\_ Visually check the following:
- \_\_\_\_\_ Remove the slag with a chipping hammer and clean the bead using steel brush.
- \_\_\_\_\_ Use E6013 electrode and tack weld the metal to form a T- joint.
- \_\_\_\_\_ Properly clean the metal for inspection.
- \_\_\_\_\_ Clamp firmly the workpiece to the welding positioner and clean the joint to be welded.
- \_\_\_\_\_ Set up the welding machine and adjust the correct current amperage settings at 95 amps.
- \_\_\_\_\_ Wear the appropriate Personal Protective Equipment (PPE) before welding.
- \_\_\_\_\_ Deposit the second pass. It should overlap the first bead by half or  $\frac{2}{3}$
- \_\_\_\_\_ Deposit the third pass. It should overlap the second bead by half or  $\frac{2}{3}$ .



## **BRIEF INTRODUCTION**

Visual examination is the most widely used non-destructive testing technique. It is extremely effective and is the less expensive inspection method. The welding inspector can utilize visual inspection throughout the entire production cycle of a weldment. It is an effective quality control method that will ensure procedure conformity and will find errors at early stages. Visual inspection can be subdivided into three (3) divisions such as;

1. Visual examination prior to welding
2. Visual examination during welding and
3. Visual examination of the finished weldment.

### **VISUAL EXAMINATION PRIOR TO WELDING**

These items that must be reviewed and checked prior to welding:

1. All applicable drawings, specifications, procedures, welder qualification, and others.
2. Material specification of parts comprising the weldment to determine if it follows required specifications.
3. Compare edge preparation of each joint with the drawings.
4. Check dimensions of each item since they will affect weldment fit up.
5. At the fit up operation, check-up assembly dimensions and fitup.
6. At the fit up, check the cleanliness of welding joint and condition of tackweld.

### **VISUAL EXAMINATION DURING WELDING**

When welding begins, there are several items that should be checked, including welding procedures. Make sure that they are in order, applicable to the weldment, and available to the people doing the welding.

Here are the important items that must be checked:

1. Determine that the designated welding process and method of application are in accordance with the procedure.
2. Determine designated electrode for the base metal.
3. Inspect/Check welding equipment to make sure that it is in good operating condition.
4. Determine that correct welding current and proper polarity are being used.
5. Determine that pre-heat requirements are adhered to at the time of welding.

6. Identify all welders assigned to the weldment, job or joint in question.
7. Observe welders making welds. This has a rather starting effect on welders, especially when they know that their welds are being watched as they are being made.
8. Determine if interpass temperatures are being maintained. If welding operations are discontinued for a while, interpass temperatures must be obtained before welding is resumed.
9. Determine that interpass cleaning by chipping, grinding and gouging are being done in accordance with procedure.
10. Watch out for slugging. (Example: adding rod or metal to a weld groove that weakens the joints)

### **VISUAL EXAMINATION AFTER WELDING- COMPLETED WELDMENT**

The inspector is expected to determine that weldment conforms to the working drawing and specifications for which it is designed and constructed. The weld must all be made to the size specified.

Here are some items that must be considered:

1. It is important to check the size of all welds. The size of fillet welds can easily be determined by means of using weld gauges, such as: Fillet weld gauge, U.S. Navy weld gauge, and British welding gauge.
2. All welds should be inspected to see that they do not have any of the following defects:
  - a. Surface cracks
  - b. Crater cracks or underfill
  - c. Surface porosity
  - d. Incomplete root penetration
  - e. Undercoat
  - f. Underfill on face, groove or fillet (concave)
  - g. Excessive face reinforcement, groove or fillet (convex)
  - h. Overlap
  - i. Misalignment (high-low)
  - j. Arc strikes
  - k. Excessive spatter
3. Other weldment defects that must be checked:
  - a. Warpage – Beyond allowable or acceptable limits.
  - b. Base metal defect – Scabs or seams in the base metal.
  - c. Backing welds – A question about quality of root fusion.



## ACTIVITIES

### Activity 1

**Directions:** Complete the table by writing at least 5 items to be reviewed, checked in considered in conduction visual inspection.

PRIOR TO WELDING
1.
2.
3.
4.
5.

DURING WELDING
1.
2.
3.
4.
5

AFTER WELDING
1.
2.
3.
4.
5.

## Activity 2

**Directions:** Here are important items to be checked in conducting visual inspection in welding. Write when it is done - **Before, During** or **After**.

- \_\_\_\_\_ 1. Check all applicable drawings, specifications and procedure.
- \_\_\_\_\_ 2. Determine correct welding current and polarity being used.
- \_\_\_\_\_ 3. Determine designated electrode if appropriate for the base metal.
- \_\_\_\_\_ 4. Check weld sizes of all welds.
- \_\_\_\_\_ 5. Check dimensions of each item since they will affect weldment fit up.



### REMEMBER

Conducting visual examination is the most widely used non-destructive testing technique. It is extremely effective and is the less expensive inspection method. The welding inspector can utilize visual inspection throughout the entire production cycle of a weldment. It is an effective quality control method that will ensure procedure conformity and will find errors at early stages.

When welding begins, there are several items that should be checked, including welding procedures. Make sure that they are in order, applicable to the weldment, and available to the people doing the welding.

The inspector is expected to determine that weldment conforms to the working drawing and specifications for which it is designed and constructed. The weld must all be made to the size specified.



## CHECK YOUR UNDERSTANDING

**Directions:** Express what you have learned in this lesson by answering the questions.

1. What is the difference between the visual prior to welding, visual during welding and visual after welding completed?

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2. Why is conducting visual inspection important?

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## POST TEST

**Direction:** Label these events of visual inspection, if it is done **BEFORE**, **DURING** or **AFTER** welding.

- \_\_\_\_\_ 1) Compare weld preparation of each joint with the drawings.
- \_\_\_\_\_ 2) Check assembly dimension and fit up.
- \_\_\_\_\_ 3) Materials specification of parts comprising the weldment to determine if it follows required specifications
- \_\_\_\_\_ 4) Check all applicable drawings, specifications, procedures, and welder's qualifications.
- \_\_\_\_\_ 5) All welds are inspected for weld defect.
- \_\_\_\_\_ 6) Determine that pre heat requirements are adhered at the time of welding.
- \_\_\_\_\_ 7) Determine that correct welding current and proper polarity are being used.
- \_\_\_\_\_ 8) Determine that interpass cleaning by chipping, grinding, and gouging are being done in accordance with procedures.
- \_\_\_\_\_ 9) Determine designated electrode for the base metal.
- \_\_\_\_\_ 10) Size of all welds are checked using appropriate weld gauges.

	<p><b>Activity 1</b> <b>Prior</b></p> <ol style="list-style-type: none"> <li>1. All applicable drawings, specifications, procedures, welder qualification, and others.</li> <li>2. Material specification of parts comprising the weldment to determine if it follows required specifications.</li> <li>4. Compare edge preparation of each joint with the drawings.</li> <li>4. Check dimensions of each item since they will affect weldment fitup.</li> </ol> <p>At the fit up operation, check-up assembly dimensions and fitup.</p> <p><b>DURING</b></p> <ol style="list-style-type: none"> <li>1. Determine that the designated welding process and method of application are in accordance with the procedure.</li> <li>2. Determine designated electrode for the base metal.</li> <li>3. Inspect/Check welding equipment to make sure that it is in good operating condition.</li> <li>4. Determine that correct welding current and proper polarity are being used.</li> <li>5. Determine that pre-heat requirements are adhered to at the time of welding.</li> </ol> <p><b>AFTER</b></p> <ol style="list-style-type: none"> <li>1. It is important to check the size of all welds.</li> <li>2. All welds should be inspected to see that they do not have any of the following defects:</li> <li>3. Other weldment defects that must be checked:</li> </ol> <p><b>Activity 2</b></p> <ol style="list-style-type: none"> <li>1. Before</li> <li>2. During</li> <li>3. Before</li> <li>4. After</li> <li>5. Before</li> </ol>	<p><b>Key to Corrections:</b></p> <p><b>Pre-test</b></p> <ol style="list-style-type: none"> <li>1. After</li> <li>2. Before</li> <li>3. During</li> <li>4. Before</li> <li>5. Before</li> <li>6. After</li> <li>7. Before</li> <li>8. Before</li> <li>9. During</li> <li>10. During</li> </ol> <p><b>Looking Back</b></p> <ol style="list-style-type: none"> <li>A. 2</li> <li>B. 6</li> <li>C. 11</li> <li>D. 7</li> <li>E. 4</li> <li>F. 10</li> <li>G. 6</li> <li>H. 3</li> <li>I. 1</li> <li>J. 8</li> <li>K. 9</li> </ol>
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## References

- *K12 Basic Education Curriculum, Grade 10, SMAW LM Final Check and verified page 105-109.*
- Public Technical Vocational High Schools, Competency-Based Learning material, SMAW NCI, (Department of Education 2008)