METALS AND FABRICATION
ARC WELDING 1
Basic Arc Welding
Review Questions

Metals and Engineering
Arc Welding 1
Basic Arc Welding

Review Questions
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Chapter 1 – Arc welding safety

1. Pictured below is a welder wearing personal protective equipment (PPE). Label the items indicated.

Fig 1.1 – Dressed for safety

2. To achieve safe working conditions in the metal fabrication and welding industry, who should recognise hazards within their working environment? (Circle one correct answer)

- Your employer
- You
- All personnel
- Your mother
3. Name five (5) types of hazards associated with the metal fabrication and welding industry.
   1. ____________________________
   2. ____________________________
   3. ____________________________
   4. ____________________________
   5. ____________________________

4. Who is responsible for wearing personal protective equipment (PPE)?
   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________

Electric shock

1. List the three (3) major principles involved in preventing electric shock from welding equipment.
   1. ____________________________
   2. ____________________________
   3. ____________________________

2. Give a definition of open circuit voltage.
   ____________________________
   ____________________________
   ____________________________
   ____________________________

3. What is the maximum open circuit voltage for welding machines in Australia?
   1. Maximum OCV for AC welding machines __________________
   2. Maximum OCV for DC welding machines __________________
4. List three (3) recommended practices to avoid electric shock.
   1. ____________________________________________________
   2. ____________________________________________________
   3. ____________________________________________________

5. Can the primary electrical lead on a welding machine be serviced by the welding operator? (Tick the correct answer)
   Yes  No

6. Does sweating increase the risk of electric shock? Why/why not?
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

Fumes

1. Fumes are produced in all welding and cutting operations. They are a mixture of four (4) substances. What are the four (4) substances?
   1. ____________________________________________________
   2. ____________________________________________________
   3. ____________________________________________________
   4. ____________________________________________________

2. What does the acronym MSDS stand for?
   ____________________________________________________

3. Referring to the MSDS for chromium, what disease can chromium compounds cause in humans?
   ____________________________________________________
4. What protective equipment should be utilised to reduce the effects of the following?
   - Fumes
   - Radiation
   - Burns
   - Electric Shock

5. There are four (4) types of ventilation. Explain local exhaust ventilation.

6. What is a limitation of personal respiratory protection?

Radiation

1. Name the three (3) types of radiation emitted by the welding process.
   1.
   2.
   3.

2. Briefly explain arc eye/welding flash.
3. What is the recommended filter lens for a manual metal arc welding process using 100–200 amps? (Circle one correct answer)

- Shade No 8
- Shade No 10
- Shade No 11
- Shade No 12
- Shade No 13

4. What can prolonged exposure to ultraviolet radiation cause?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

5. Can an operator receive burns from reflected radiation? (Tick the correct answer)

[ ] Yes  [ ] No

6. Complete this sentence.

Adequate protection should be provided for all personnel within ____________ of an open arc or gas flame.

Fire and explosion

1. Oxy-acetylene flame cutting and welding operations can cause the combustion of many materials such as wood, paper, synthetic materials, paint, oil and grease. How far from the workstation should these combustible items be kept clear?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. List four (4) precautions that could prevent fire or explosion.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
3. The arc and flame can be an ignition source for fire and explosions. Name two (2) other ways that a fire or explosion can be ignited.
   1. ____________________________
   2. ____________________________

4. Being aware of fire extinguisher locations is extremely important. What else is important to know in regards to fire extinguishers?
   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________

Burns

1. List five (5) sources in the welding and cutting operations that can cause burns.
   1. ____________________________
   2. ____________________________
   3. ____________________________
   4. ____________________________
   5. ____________________________

2. Explain how an operator can protect him/herself from the five (5) sources causing burns.
   ____________________________
   ____________________________
   ____________________________
   ____________________________

3. List four (4) items of protective equipment you would be required to wear when performing welding and cutting operations.
   1. ____________________________
   2. ____________________________
   3. ____________________________
   4. ____________________________
The working environment

1. Give a definition and an example of a confined space.

2. When working in confined spaces, the welding operator is at risk from a build up of fumes and what else?

3. When working in confined spaces, what is the maximum voltage for lighting?

4. When working in confined spaces, the operator must follow mandatory regulations. One of those regulations requires an observer to be present outside the confined space. What are the observer’s duties and responsibilities?

5. What is the definition of a hazardous location?

6. What are four (4) main groups of hazardous locations?
   1. __________________________
   2. __________________________
   3. __________________________
   4. __________________________
7. How long should a fire watch monitor a site after welding or cutting has taken place? (Circle one correct answer)
   • 2 hours  • 1 hour
   • 1 day  • 12 hours

8. Prior to welding or cutting on tanks and containers, there is a possibility that the tank or container may have held a volatile substance. What is the recommended practice to carry out the welding or cutting process safely?

9. When in doubt as to what the container has held in it, what should you do?

First aid for operators

1. In the event of an emergency, state the three (3) actions that must occur.
   1. __________________________________________
   2. __________________________________________
   3. __________________________________________

2. What basic immediate action would a first aid person administer to the following injuries?
   • Welding flash
     __________________________________________
   • Hot particles embedded in the eye
     __________________________________________
   • Minor burns
     __________________________________________
- Major burns
- Electric shock
- Severe bleeding
- Inhalation of toxic fumes
Chapter 2 – Electricity and welding machines

1. State the three (3) main requirements all welding processes depend on for their operation.
   1. ____________________________________________
   2. ____________________________________________
   3. ____________________________________________

2. The welding current must meet three (3) requirements to be suitable for welding. Name these three (3) requirements.
   1. ____________________________________________
   2. ____________________________________________
   3. ____________________________________________

3. What do the acronyms AC and DC stand for?
   - AC ____________________________________________
   - DC ____________________________________________

4. Direct current can be produced by: (Circle one correct answer)
   - Alternator
   - Mains power
   - Generator

5. When welding with positive (+) polarity, which terminal is the electrode lead connected to?
   ____________________________________________

6. While welding with direct current, two-thirds of the heat is generated at which pole? (Circle one correct answer)
   - Positive (+)
   - Negative (-)
7. Have you got a choice of polarity with alternating current? (Tick the correct answer)

- [ ] Yes
- [ ] No

8. Arc blow is an electromagnetic interference that causes arc instability with which power source?

9. Name four (4) methods that can be used to control or minimise arc blow.

1. 
2. 
3. 
4. 

10. State two (2) advantages and two (2) disadvantages of direct current.

   Advantages
   1. 
   2. 

   Disadvantages
   1. 
   2. 

11. Give a definition of the following terms.

   Open circuit voltage (OCV)
Arc voltage

12. State the maximum open circuit voltage for the following power sources.
   • AC
   • DC

13. What is the purpose of a rectifier?

14. What three (3) main factors would determine the choice of a welding machine?
   1.
   2.
   3.
Chapter 3 – Weld preparation and workmanship

1. Name five (5) factors that you would need to consider when determining a weld joint and its preparation.
   1. 
   2. 
   3. 
   4. 
   5. 

2. On the fillet weld below, clearly identify the following parts.
   - Leg length
   - Root
   - Penetration
   - Designed throat thickness
   - Reinforcement
   - Toe
3. Which part of a mitre fillet weld, when measured, governs its size?

4. A 10 mm fillet weld is required and a concaved fillet is produced with leg lengths of 10 mm. Is this weld acceptable? (Tick the correct answer)
   Yes  No

5. A 10mm fillet weld is required. What would be the designated throat thickness?

6. What is the minimum overlap of material for lap joints carrying stress?

7. Sketch and identify the parts of a butt weld preparation.

8. Plate can be prepared in a number of ways. Name five (5) of these methods.
   1. __________________________________________
   2. __________________________________________
   3. __________________________________________
   4. __________________________________________
   5. __________________________________________
9. Name four (4) types of butt welds.
   1. __________________________________________
   2. __________________________________________
   3. __________________________________________
   4. __________________________________________

10. What butt weld preparation is recommended for the following plate thicknesses?
    - 3 mm plate __________________________________________
    - 6 mm plate __________________________________________
    - 10 mm plate __________________________________________
    - 32 mm plate __________________________________________

11. Describe the difference between the following.
    - Backing run
      __________________________________________
      __________________________________________
      __________________________________________
    - Backing bar
      __________________________________________
      __________________________________________
      __________________________________________

12. What is the requirement of a backing strip?
    __________________________________________
    __________________________________________
    __________________________________________
Chapter 4 – Air-arc gouging

1. Why is air-arc gouging a preferred method of removing metal?

2. There are many advantages of using air-arc gouging compared to flame gouging. What are the disadvantages?

3. Unlike flame gouging, why can air-arc gouging be used on non-ferrous materials?

4. What is the composition of the consumable electrode?
5. Name two (2) areas of risk that the operator must protect him/herself against.
   1. 
   2. 

6. What is the air pressure required for the air-arc process?
   

7. Name four (4) factors that determine the size of the groove.
   1. 
   2. 
   3. 
   4. 

Chapter 5 – Manual metal arc welding (MMAW)

1. Fill in the labels on the diagram below of MMAW equipment.

2. For the MMAW process, state the following.
   - The heat source
   - The method of atmospheric shielding
   - The source of filler wire
3. List five (5) advantages of the MMAW process.
   1. 
   2. 
   3. 
   4. 
   5. 

4. List two (2) limitations of the MMAW process.
   1. 
   2. 

5. State four (4) common uses of the MMAW process.
   1. 
   2. 
   3. 
   4.
6. State five (5) effects of increasing the amperage when using MMAW.
   1. 
   2. 
   3. 
   4. 
   5. 

7. State three (3) defects that may be caused by excessive arc length when welding with MMAW.
   1. 
   2. 
   3. 

8. The electrode’s lead angle of travel is commonly set at 60–70 degrees. What effects (if any) would occur if the lead angle is too flat?
9. Pictured below are three different effects of amperage. One shows the result of correct current, one the result of current too high, and the other of current too low. Label each one correctly.

Fig 5.2 – Effects of amperage
10. Which variable has the greatest effect on heat input with MMAW?

11. List four (4) weld defects that can occur as ‘external defects’ only.
   1. 
   2. 
   3. 
   4. 

12. List four (4) problems that will cause or lead to increased undercut.
   1. 
   2. 
   3. 
   4. 

13. List two (2) causes of excessive spatter.
   1. 
   2. 

14. List three (3) causes of porosity.
   1. 
   2. 
   3. 

15. List three (3) causes of slag inclusions in MMAW.
   1. 
   2. 
   3. 

16. How can crater cracks become a major problem?
   
   
   
   

17. List the four (4) flux types of electrodes for welding carbon and low alloy steels.
   1. 
   2. 
   3. 
   4. 

18. List six (6) functions of the electrode flux coating.
   1. 
   2. 
   3. 
   4. 
   5. 
   6. 

19. List six (6) factors which require consideration when selecting an electrode for a particular job.
   1. 
   2. 
   3. 
   4. 
   5. 
   6.
20. From the four (4) electrode flux types, select the one which best completes the following statements.
   - The flux type which contains the most moisture is
   - The flux type which contains the least moisture is
   - The electrode used for welding high strength steel is
   - The electrode which produces the deepest penetration is
   - The general purpose electrode is
   - The electrode which gives the highest deposition is
   - The electrode which produces the highest spatter level is

21. General purpose electrodes all have the same flux type and may have one of three (3) classification numbers. What are they?
   1. 
   2. 
   3. 

22. The approximate amperage range for a 3.2 mm diameter electrode classified E4112 is ____________ amps.

23. State three (3) types of deterioration/damage which can occur to electrode flux coating.
   1. 
   2. 
   3. 
24. State five (5) effects which can be caused by excessive moisture in electrode flux coverings.
   1. 
   2. 
   3. 
   4. 
   5. 

25. The electrode flux type that must not be stored in an electrode oven is ________________.

26. The electrode type that should be stored at a minimum temperature of 100 degrees is ________________.

27. If hydrogen-controlled electrodes become excessively damp, what are the drying recommendations?

28. State the flux type and the electrode classification of the electrode that has a recovery rate of 130% of the core wire mass.
   • Flux type ______________________
   • Classification ______________________

29. What do the following groups of digits in the electrode classification below indicate?
   • E ______________________
   • 43 ______________________
   • 13 ______________________

30. State the electrode classification for a low hydrogen type electrode that is designed to run on DC (+) only.
Chapter 6 – Gas tungsten arc welding (GTAW)

1. Name four (4) hazards associated with welding.
   1. ___________________________________________________________________
   2. ___________________________________________________________________
   3. ___________________________________________________________________
   4. ___________________________________________________________________

2. How can you reduce your exposure to these hazards?
   Hazard: ___________________________________________________________________
   Hazard: ___________________________________________________________________
   Hazard: ___________________________________________________________________
   Hazard: ___________________________________________________________________

3. High frequency will increase the risk of which hazard?
   ___________________________________________________________________
4. Name the three (3) types of radiation associated with the welding process.
   1. 
   2. 
   3. 

5. Name three (3) advantages of the GTAW process.
   1. 
   2. 
   3. 

6. Name two (2) limitations of the GTAW process.
   1. 
   2. 

7. In the picture below, name the parts of the GTAW torch.

   Fig 6.1 – The GTAW torch
8. What type of welding current is recommended for welding mild steel and stainless steel?

__________________________________________________________

9. What weld characteristic is achieved by using DC electrode negative?

__________________________________________________________

10. Why is DC electrode positive current not recommended for GTAW?

__________________________________________________________

11. What type of current is required to weld aluminium?

__________________________________________________________

12. What type of shielding gas is most commonly used for GTAW in Australia?

__________________________________________________________

13. A flow meter controls the amount of gas being supplied to the torch. State the recommended rate in litres per minute.

__________________________________________________________

14. Name four (4) types of non consumable electrodes used in GTAW.

   1. _____________________________________________________
   2. _____________________________________________________
   3. _____________________________________________________
   4. _____________________________________________________

15. Why is it recommended to use ceriated tungsten electrodes instead of thoriated or zirconiated tungsten electrodes?

__________________________________________________________

__________________________________________________________

__________________________________________________________
16. How should the tungsten electrode be prepared for the following welding currents?
   - DC electrode negative
   - Alternating current/high frequency

17. State three (3) causes of arc wander (arc blow).
   1. 
   2. 
   3. 

18. If you experience arc wander (arc blow) caused by a magnetic interference, what two (2) methods can you use to eliminate or reduce the problem?
   1. 
   2. 
Chapter 7 – Gas metal arc welding (GMAW)

1. Fill in the missing words in the sentences below relating to GMAW safety.

1. GMAW requires a filter one shade _________________ than that used for welding at the same amperage with the MMAW process.

2. When arc welding, a toxic gas called _________________ is given off from the arc.

3. According to Australian Standard® ________________ _________________, GMAW cannot be used in windy conditions.

4. Clear safety glasses must be worn at all times, due to the high level of __________________ __________________( _____ ) emission, and the risk of arc __________________.

5. _________________ materials have less resistance to UV rays than woollen materials.

6. When working with GMAW in confined spaces where ventilation is restricted, use __________________ __________________.

2. Since its introduction in 1940, why has GMAW become the preferred welding process?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

3. How is the molten weld pool protected from the atmosphere?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
4. What is the major advantage of the GMAW process?

5. Describe what is meant by the term ‘high deposition rate’.

6. List five (5) advantages of the GMAW process.
   1. 
   2. 
   3. 
   4. 
   5. 

7. List three (3) limitations of the GMAW process.
   1. 
   2. 
   3. 
8. Why is it recommended that the operator uses a darker shaded filter lens for GMAW than that required when welding with MMAW?

9. Fumes are generated when welding with the GMAW processes. How can the effects of fume inhalation be reduced?

10. What type of current is required for the GMAW process?

11. What is the primary function of the wire feed unit?

12. State the three (3) functions that occur when the hand piece trigger is depressed.
   1. 
   2. 
   3. 
13. What is the purpose of the following components?
   - Regulator
     __________________________________________________________
     __________________________________________________________
   - Flow meter
     __________________________________________________________
     __________________________________________________________
   - Heater
     __________________________________________________________
     __________________________________________________________

14. Name the three (3) basic type wire feed units, and give a brief description of each.
   1. __________________________________________________________
     __________________________________________________________
     __________________________________________________________
   2. __________________________________________________________
     __________________________________________________________
     __________________________________________________________
   3. __________________________________________________________
     __________________________________________________________
     __________________________________________________________

15. What is the purpose of the drive rollers?
    __________________________________________________________
    __________________________________________________________
    __________________________________________________________
16. If excessive pressure is applied to the drive rollers, what effect will this have to the feed of wire?

17. State two (2) functions of the contact tip.
   1. 
   2.

18. There are three (3) types of metal transfer in GMAW. State these, and give the voltage and amperage range of each one.

<table>
<thead>
<tr>
<th>Transfer type</th>
<th>Voltage</th>
<th>Amperage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. Which metal transfer has the highest deposition rate?

20. List two (2) advantages of using pulsed current welding machines.
   1. 
   2. 
21. What Australian Standard® code represents gas metal arc welding electrodes?

22. Explain the parts of the electrode classification shown below.

![Electrode classification diagram]

23. State four (4) factors that will change when increasing the amperage.
   1. 
   2. 
   3. 
   4. 

24. What effects will occur if the arc voltage is increased?
   
   
   
   

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25. What will an increase in travel speed cause?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

26. State three (3) effects that an increase in electrical stick-out will cause.
   1. ______________________________________________________________________
   2. ______________________________________________________________________
   3. ______________________________________________________________________

27. Name the shielding gas that would be used to weld carbon and low alloy steels.
    ______________________________________________________________________

28. What is the recommended flow rate of argon/carbon dioxide shielding gas?
    ______________________________________________________________________

29. Name three (3) causes of porosity when welding with GMAW.
   1. ______________________________________________________________________
   2. ______________________________________________________________________
   3. ______________________________________________________________________

30. Explain the term ‘lack of fusion’.
    ______________________________________________________________________
    ______________________________________________________________________
    ______________________________________________________________________
31. Explain the term ‘undercut’.

32. State three (3) causes of excessive spatter.
   1. 
   2. 
   3. 

33. Is cracking in any form acceptable? (Tick the correct answer)
   Yes [ ] No [ ]

34. State two (2) causes that make the wire fuse to the contact tip.
   1. 
   2. 

Chapter 8 – Flux-cored arc welding (FCAW)

1. Complete the missing words in the sentences below.

The flux-cored arc welding process employs an ____________, which is essentially a formed ____________ sheath in which is contained a ____________ of ____________. A major advantage of FCAW compared to GMAW is that the higher ____________ densities used means that the mode of ____________ transfer across the ____________ is always ____________ transfer.

The flux core serves as a ____________ to introduce ____________ and ____________ elements into the weld. The flux is low in ____________ and the process is therefore suitable for welding ____________ steels and other ____________ and ____________ steels.

2. State three (3) advantages of the flux-cored welding process.
   1. __________________________________________________________________________
   2. __________________________________________________________________________
   3. __________________________________________________________________________
3. What is the smallest diameter seamless wire manufactured for the FCAW process? (Circle one correct answer)
   • 0.8
   • 0.9
   • 1.2
   • 1.6

4. Name two (2) types of the FCAW process and give a brief description of each.
   1. Type ________________________________
      ________________________________
      ________________________________
      ________________________________
   2. Type ________________________________
      ________________________________
      ________________________________
      ________________________________

5. State three (3) limitations of the FCAW process.
   1. __________________________________
   2. __________________________________
   3. __________________________________

6. What type of drive rolls are required for the FCAW process?
   __________________________________
   __________________________________

7. Electrode stick-out is important with FCAW. What could occur if the stick-out is too short or too long?
   • Too short
      __________________________________
      __________________________________
      __________________________________
   • Too long
      __________________________________
      __________________________________
      __________________________________
8. Increasing the voltage may have what effect on FCAW welding?

9. On the diagram of gas-shielded FCAW below, draw in the correct angle for the torch position to direction of travel. If you can’t draw the angle exactly, put the degree of angle in the label.

10. State two (2) advantages of the self-shielding FCAW process.
   1. ____________________________________________
   2. ____________________________________________

11. State two (2) limitations of the self-shielding FCAW process.
   1. ____________________________________________
   2. ____________________________________________
12. Increasing the amperage will have what effect on FCA welding?

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

13. For the FCAW wire classification system below, fill in the missing references.

![Fig 8.2 – FCAW wire classification](image)

E T D – Mp – W 50 2 H

Fig 8.2 – FCAW wire classification

14. The most common defects encountered with FCAW are listed in the following table. For each one, provide a definition (or explain the cause of the defect), and how the defect can be avoided and/or rectified.

<table>
<thead>
<tr>
<th>Defect</th>
<th>Definition/Cause</th>
<th>Avoidance/Rectification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracks</td>
<td></td>
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<tr>
<td>Crater cracks</td>
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<td>Porosity</td>
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<tr>
<td>Stray arcing</td>
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<td>Slag inclusions</td>
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<tr>
<td>Lack of fusion and/or lack of root penetration</td>
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<tr>
<td>Excessive penetration</td>
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15. Why is stray arcing considered as a problem?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Chapter 9 – Submerged arc and electro-slag welding processes

1. Give a description of how the molten weld pool is protected from the atmosphere in submerged arc welding.

2. State two (2) limitations that the submerged arc welding process has.
   1. 
   2. 

3. State four (4) advantages of the submerged arc welding process.
   1. 
   2. 
   3. 
   4. 

4. What current type gives the operator greater control over bead shape and penetration?
5. What is an advantage of using DC electrode positive?

6. State three (3) advantages of using DC current.
   1. 
   2. 
   3. 

7. When is arc blow likely to occur?

8. Submerged arc welding wires classifications are broken up into three groups of elements. Describe the following classification.

   ![](EL_12K-FMM-W504.png)

   **Fig 9.1 – SAW classification**
9. By decreasing the voltage on a submerged arc welding machine it will: (Circle the correct answer)
   - increase the bead width
   - increase penetration
   - increase weld speed
   - decrease penetration.

10. Increasing travel speed will: (Circle the correct answer)
    - produce wider weld beads
    - decrease weld size
    - increase penetration
    - produce excessive spatter.

11. List three (3) functions of submerged arc welding flux.
    1. ______________________________________
    2. ______________________________________
    3. ______________________________________

12. Will excessive flux height have any effect on the weld characteristic? (Tick the correct answer)
    - Yes
    - No

13. How is ‘open arcing’ caused?
    ______________________________________
    ______________________________________
    ______________________________________
14. Explain the three (3) principal causes of cracking in submerged arc welding.
   1. 
   2. 
   3. 

15. Describe the electro-slag welding process.
METALS AND FABRICATION
ARC WELDING 1
Basic Arc Welding

Review Questions

DESCRIPTION
This book contains review questions based on the content of Arc Welding 1 – Basic Arc Welding Information Book, product code ENG093. It can be used as a ‘partner’ to that book, to provide students with the opportunity to review their learning. It may also be used as an assessment tool, enabling students to demonstrate their understanding of basic arc welding principles.

The book is divided into chapters, to match the chapters in Arc Welding 1.
• Chapter 1 – Arc welding safety
• Chapter 2 – Electricity and welding machines
• Chapter 3 – Weld preparation and workmanship
• Chapter 4 – Air-arc gouging
• Chapter 5 – Manual metal arc welding (MMAW)
• Chapter 6 – Gas tungsten arc welding (GTAW)
• Chapter 7 – Gas metal arc welding (GMAW)
• Chapter 8 – Flux-cored arc welding (FCAW)
• Chapter 9 – Submerged arc and electro-slag welding processes

For more information about the content covered by Arc Welding 1, please refer to our product catalogue description using its product code; ENG093.

EDITION
2009

CATEGORY
Metals and Engineering

TRAINING PACKAGE
• MEM05

RELATED PRODUCTS
• ENG093: Arc Welding 1 – Basic Arc Welding Information Book