

Magnetic Particle Testing Method Questions & Answers Book

Second Edition

Supplement to
Recommended Practice No. SNT-TC-1A
Book B

Levels I, II and III
Review Questions



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ASNT Mission Statement:

ASNT exists to create a safer world by promoting the profession and technologies of nondestructive testing.

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David G. Moore – Sandia National Laboratories

Recommended References

Magnetic Particle Testing Method

The following references were used in formulating the questions contained in this book.

- A.* Betz, Carl E. *Principles of Magnetic Particle Testing*. Chicago, IL: Magnaflux Corporation (2000).
- B.* *Magnetic Particle Testing Classroom Training Book*. Columbus, OH: The American Society for Nondestructive Testing, Inc. (2004).
- C.* Moore, David G., tech. ed., and Patrick O. Moore, ed. *Nondestructive Testing Handbook*, third edition: Volume 8, *Magnetic Testing*, Columbus, OH: The American Society for Nondestructive Testing, Inc. (2008).
- D.* Eick, Chuck W. *Level II Study Guide: Magnetic Particle Testing Method*, second edition, Columbus, OH: The American Society for Nondestructive Testing, Inc. (2003).
- E.* Fenton, John D. *ASNT Level III Study Guide: Magnetic Particle Testing Method*, second edition, Columbus, OH: The American Society for Nondestructive Testing, Inc. (2006).

* Available from The American Society for Nondestructive Testing, Inc.

The following reference is frequently cited in contracts and may be a useful study aid. There are no questions in this book that refer to this reference.

- F. ASTM E 1444, *Standard Practice for Magnetic Particle Examination*, West Conshohocken, PA: ASTM International. Current edition.

Each question found in this book is followed by letter(s) and page number(s) indicating the specific recommended reference(s) where the answer may be found. For example:

27. A metal that is difficult to magnetize is said to have:
- a. high permeability
 - b. low permeability
 - c. low coercive force
 - d. low retentivity

C.56

In this example, the letter "C" refers to Reference C in the list above and 56 is the specific page in Reference C where the answer to the question is located.

Reference Usage

Reference A: Total = 64
Level I 10
Level II 31
Level III 23

Reference B: Total = 3
Level I 3
Level II 0
Level III 0

Reference C: Total = 161
Level I 75
Level II 46
Level III 40

Reference D: Total = 7
Level I 4
Level II 3
Level III 0

Reference E: Total = 23
Level I 14
Level II 6
Level III 3

Level I Questions

Magnetic Particle Testing Method

1. Magnetic particle is a nondestructive testing method used for:
 - a. locating surface and near-surface discontinuities in aluminum
 - b. locating surface and near-surface discontinuities in steel
 - c. finding and measuring material separation
 - d. measuring flux density

C.2
2. Ferromagnetic material is:
 - a. strongly attracted by a magnet
 - b. not highly saturated by magnetic fields
 - c. a material with a 0 permeability measurement
 - d. not capable of being magnetized

C.380; E.3
3. The permeability of a material describes:
 - a. the ease with which it can be magnetized
 - b. the depth of the magnetic field in the part
 - c. the length of time required to demagnetize it
 - d. the ability to retain the magnetic field

C.385; E.6
4. The retentivity of a material describes:
 - a. the ease with which it can be magnetized
 - b. the depth of the magnetic field in the part
 - c. the length of time required to demagnetize it
 - d. the ability to retain the magnetic field

C.387; E.4
5. Magnetic particles are available in different colors:
 - a. for color contrast with the part surface thereby enhancing detection of indications
 - b. to enhance the detection of indications by allowing background color matching
 - c. to determine if an indication is surface or subsurface
 - d. to indicate different magnetic flux values

C.180
6. Which of the following can be magnetized?
 - a. iron
 - b. copper
 - c. aluminum
 - d. magnesium

C.43
7. The magnetic field is strongest when:
 - a. the magnetizing voltage is flowing
 - b. the magnetizing current is flowing
 - c. the material exhibits high coercive forces
 - d. the magnetizing current is not flowing

C.54
8. If a crack exists in a circular magnet, the attraction of magnetic particles to the crack is caused by:
 - a. a coercive force
 - b. a leakage field
 - c. a Doppler effect
 - d. a high reluctance at the crack

C.49

9. The unit usually used to denote flux density is:
- tesla
 - henry
 - farad
 - ampere
- C.54
10. Which statement is true when related to magnetic lines of force?
- they are often forced to cross due to part geometry
 - they are most dense at the poles of a magnet
 - they seek the path of most resistance
 - they cannot be detected
- C.44
11. Magnetic flux lines that are parallel to a discontinuity produce:
- strong indications
 - weak indications
 - no indications
 - fuzzy indications
- C.48
12. A part is adaptable to magnetic particle inspection if:
- it is attached to an electrostatic field
 - the material is ferromagnetic
 - the material is nonferrous
 - the material is an electric conductor
- C.43
13. What rule describes the direction of current flow (+ to -) when lines of magnetic force surround a conductor?
- left-hand rule
 - right-hand rule
 - flux rule
 - reluctance rule
- C.50
14. The magnitude of the residual magnetic field in a specimen is dependent on:
- the length-to-diameter ratio (L/D)
 - the strength of the applied magnetizing force
 - the right-hand rule
 - the left-hand rule
- C.54
15. The proper number of ampere-turns for a given test specimen being examined by longitudinal magnetism is determined by:
- its length and diameter
 - the material
 - the diameter and the material
 - its diameter
- A.182
16. A circular field may be induced into a specimen by:
- placing the part in an energized coil
 - passing current directly through the part
 - passing a magnetic field through the part
 - placing the part in a north-south orientation
- C.50
17. An electrical yoke produces:
- a longitudinal field
 - a circular field
 - alternating fields
 - a swinging field
- C.53; E.27
18. An energized coil around the part produces:
- a circular field
 - a longitudinal field
 - an intermittent field
 - a field dependent on the type of current applied
- C.51; E.9

19. In longitudinal magnetization the proper term for calculating magnetizing force is:
- amperes
 - ampere-turns
 - watts
 - ohms
- A.182
20. Magnetic lines of force:
- travel in straight lines
 - form a closed loop
 - are randomly oriented
 - overlay in highly ferromagnetic materials
- C.44; E.4
21. A magnetic particle buildup from a discontinuity is strongest when the discontinuity is oriented:
- 180 degrees to the magnetic flux flow
 - 45 degrees to the magnetic flux flow
 - 90 degrees to the magnetic flux flow
 - 90 degrees to the current flow
- C.48
22. A specimen may be demagnetized by which of the following methods?
- heat treatment below the curie temperature
 - placing the part in an alternating current coil
 - placing the part in reversing and decreasing direct current fields
 - applying a direct current yoke and removing it from the part
- A.66; E.54
23. Which of the following is an advantage of magnetic particle testing over penetrant testing?
- it does not require post-cleaning of the part
 - it requires direct access to the surface of the part
 - it can detect near-surface discontinuities
 - it requires a shorter dwell time to produce results
- A.66
24. The amount of amperage used for magnetic particle inspection using the prod method is determined from the:
- type of material
 - distance between the prods
 - diameter of the part
 - total length of the part
- C.113
25. The flux within and surrounding a magnetized part or around a conductor carrying a current is known as:
- the saturation point
 - a magnetic field
 - the ferromagnetic field
 - the paramagnetic field
- C.112
26. The areas on a magnetized part from which the magnetic field is leaving or returning into the part are called:
- salient points
 - defects
 - magnetic poles
 - nodes
- C.44
27. A metal that is difficult to magnetize is said to have:
- high permeability
 - low permeability
 - low coercive force
 - low retentivity
- C.56; E.44

28. The magnetism that remains in a piece of magnetizable material after the magnetizing force has been removed is called the:
- tramp magnetism
 - residual magnetism
 - damped magnetism
 - permanent magnetism
- C.54
29. Subsurface discontinuity indications usually appear:
- sharp and distinct
 - sharp and wide
 - wide and fuzzy
 - high and loosely held
- D.35
30. Which residual field is most difficult to demagnetize?
- longitudinal
 - circular
 - vector
 - binodal
- C.281
31. Which magnetic particle application technique is the most sensitive?
- continuous
 - residual
 - interrupted
 - counter-current
- C.64
32. Fluorescent magnetic particle indications should be inspected under:
- any light
 - a neon light
 - an ultraviolet light
 - a fluorescent light
- C.62; E.39
33. Inspecting a part by magnetizing, removing the current flow, then applying the medium is called the:
- continuous method
 - wet method
 - residual method
 - dry method
- C.63
34. Which of the following is the most effective method for the detection of near-surface defects?
- dry residual method using DC with surge
 - wet continuous method using half-wave rectified current
 - wet residual method
 - dry continuous method using half-wave rectified current with prods
- C.117
35. A curve is sometimes drawn to show graphically the relation of the magnetizing force to the strength of the magnetic field produced in a certain material. This curve is known as the:
- magnetic force curve
 - hysteresis curve
 - saturation curve
 - induction curve
- C.54; E.6
36. What method of applying particles provides greater sensitivity in locating subsurface weld discontinuities?
- continuous
 - residual
 - circular
 - longitudinal
- C.180

37. When magnetizing a weld in two directions, and if the current used in the first direction is 750 A and the current in the second direction is 400 A, which of the following is true?
- the part should be checked to see if demagnetization between operations is necessary
 - no precautions should be taken before the second operation
 - this is not a valid technique
 - there is no need to magnetize a weld in two directions
- C.278
38. When there is absolutely no pattern or distribution of magnetic particles on the part, the possible cause is that:
- the amperage setting is too high
 - the amperage setting is too low
 - the particle bath strength is too high
 - the part is made of steel with high retentivity
- A.64
39. What are three causes of nonrelevant indications?
- lack of fusion, change of section thickness, grinding cracks
 - change of section thickness, heat affected zones, drilled hole near surface
 - very high amperage, drilled hole near surface, blowholes
 - drilled hole near surface, very high amperage, lack of fusion
- C.217
40. Using the residual test method, a number of parts are magnetized and laid on a rack prior to application of magnetic particles. Why is it important that they do not rub or touch each other?
- there is a possible loss of the magnetic field
 - it may cause magnetic writing
 - it may damage the part
 - it makes parts hard to handle
- C.217
41. The point at which the magnetism in a material cannot be increased even though the magnetizing force continues to increase is known as the:
- salient pole
 - saturation point
 - residual point
 - remnant point
- C.54
42. Which type of current produces a skin effect on the surface of the part?
- alternating current
 - direct current
 - half-wave rectified
 - full-wave rectified
- C.57; E.13
43. When using the wet method, why should a high velocity flow of wet method bath over surfaces following removal of the magnetizing current not be used?
- it may wash away a fine or weakly held indication
 - this is not a problem
 - it may splash particles into eyes
 - none of the above is correct
- D.23
44. Residual magnetic particle inspection may be used when:
- parts are irregular in shape
 - parts are highly retentive
 - parts are highly stressed
 - evaluating continuous method indications
- C.63
45. Magnetic particle inspection is not a reliable method of detecting:
- laps
 - deep internal cavities
 - cracks
 - seams
- C.28