



International Association for Radio, Telecommunications and Electromagnetics, Inc.
840 Queen Street – New Bern, NC 28560 - 1-800-89-NARTE - Fax 1-252-672-0111- www.narte.org

ESD Certification Application Package

---FORMS MAY BE PHOTOCOPIED---

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About iNARTE ESD Certification

NARTE was established by industry leaders in 1982 in response to the FCC's deregulation and encouragement of industry certified personnel. As an objective third party certification body, NARTE developed an evaluation process based not only on examination, but real world skills and work experience.

Early in 1994, the Electrostatic Discharge Control (ESD) Association teamed with NARTE to implement and administer ESD certification for engineers and technicians. This certification is for engineers and technicians whose training and experience have primarily focused on problems, engineering design and corrective measures associated with minimizing or eliminating electrostatic discharge.

In 2007 the NARTE name was changed to iNARTE to recognize our growing global membership. The purpose of the ESD Credential Certification Program is to foster technical "excellence" in ESD engineering. This approach establishes technical competency criteria for ESD and enforces these criteria for technical personnel. The program benefits the individual engineer, the technician and the ESD community as a whole by establishing a standard of excellence in ESD engineering that will endure and extend across the boundaries of private and government agencies.

iNARTE ESD Certification is a four-step process based on education, work experience, peer endorsement and examination. Educational requirements for engineers include graduation from an accredited four year curriculum in engineering. For technicians, education includes graduation from a trade or vocational school course in electronic technology. A number of years of direct work experience in the field are required of both engineers and technicians. Peer and supervisory endorsements are used to substantiate the credibility of the candidate.

Examinations are confined to the area of ESD essentials. The target of the essential examination is to establish that a candidate has a broad knowledge in 30 specific areas. Detailed information regarding the ESD Examination is available on Pages 3 and 4 of this package.

Submission of the application form implies agreement to adhere to the **iNARTE Code of Ethics**, available from iNARTE HQ or online at <http://www.narte.org/h/codeofethics.asp>

ESD ENGINEER Certification Criteria

1. Complete the ESD Application Form (Page 5) and submit a **non-refundable** application fee, (available at <http://www.narte.org/h/fees.asp>).
2. Submission of the application form implies agreement to adhere to the iNARTE Code of Ethics. Available at: <http://www.narte.org/h/codeofethics.asp>
3. Provide specific record of nine years or more of experience in engineering work. Provide an up-to-date resume or complete the ESD Detailed Work History Form (Pages 7-8).
 - a) Graduation from an iNARTE-approved engineering curriculum of four years shall be considered equivalent to four years of such required experience.
 - b) The satisfactory completion of each year of such an approved engineering curriculum shall be considered equivalent to a year of such required experience.
 - c) Graduation in a physical science curriculum other than engineering will be evaluated by iNARTE.
 - d) Graduation from a college with a BSET in Engineering Technology (BSET) shall be considered as equivalent to two years of such required experience.
 - e) Graduation in a curriculum other than engineering or physical science will be evaluated by iNARTE.
 - f) Postgraduate study in engineering may be given credit up to one year.
 - g) Teaching: Engineering teaching of a character satisfactory to iNARTE shall be considered as experience not in excess of two years.
No more than 5 years experience credit will be allowed for education and/or teaching as outlined above. The mere execution or the supervision of construction of such work as a foreman, first line supervisor or superintendent shall not be deemed to be the practice of engineering.
4. Provide evidence of education and training. Official school transcripts are required. Photocopies of applicable training certificates may be submitted.
5. References: Using the iNARTE reference forms (Pages 9-10), submit a minimum of 1 supervisory reference and 2 additional references each supporting character and competency as an ESD Engineer. Reference forms must be signed and forwarded directly to iNARTE.
6. Compose 10 multiple choice questions with correct answers and supporting references (page 11-12).
7. Pass the iNARTE ESD Engineer examination.

ESD TECHNICIAN Certification Criteria

1. Complete the ESD Application Form (Page 5) and submit a **non-refundable** application fee, (available at <http://www.narte.org/h/fees.asp>).
2. Submission of the application form implies agreement to adhere to the iNARTE Code of Ethics. Available at: <http://www.narte.org/h/codeofethics.asp>.
3. Provide specific record of six years or more of experience in ESD technician work. Provide an up to date resume or complete the ESD Detailed Work History Form (Pages 7-8).
 - a) Graduation from an iNARTE-approved electronics technology curriculum of two years or U.S. Navy Class "A" school is considered equivalent to one year of required experience.
 - b) The satisfactory completion of each year of such an approved technician curriculum is considered equivalent to one year experience.
 - c) Graduation from other technician training programs will be evaluated by iNARTE.
 - d) Teaching: Engineering teaching of a character satisfactory to iNARTE may be considered as a maximum of two years experience.
No more than 5 years experience credit will be allowed for education and/or teaching as outlined above
4. Provide evidence of education and training. Official school transcripts are required. Photocopies of applicable training certificates may be submitted.
5. References: Using the iNARTE reference forms (Pages 9-10), submit a minimum of 1 supervisory reference and 2 additional references each supporting character and competency as an ESD Technician. Reference forms must be signed and forwarded directly to iNARTE.
6. Compose 10 multiple choice questions with correct answers and supporting references (page 11-12).
7. Pass the iNARTE ESD Technician examination.

Preparing for the iNARTE ESD Examination

Coordination & Procedures

Where?

iNARTE has testing centers at over 180 locations in the US and at authorized facilities worldwide. iNARTE also administers the certification examination at the ESD Association Symposium annually. If no testing location is near you, iNARTE may be able coordinate an examination session at your workplace. Contact iNARTE at 1-800-89-NARTE for locations or see the test center listing online at

<http://www.narte.org/h/testcenters.asp>

When?

Most test locations will coordinate an appointment upon request. Indicate your preferred testing dates on your application form. Once your ESD Certification application fee for Engineers or Technicians is received, (available at <http://www.narte.org/h/fees.asp>), iNARTE will effect the necessary coordination and arrangements for a testing date, time, location and point of contact.

How?

The examination for ESD engineers or ESD technicians is approximately one day duration in two sessions. All examinations are given with open book (see exam strategy below). Examinations are graded at iNARTE Headquarters and the applicant will be advised of a pass/fail within 10 working days. Passing score is 70%. Should a candidate fail the examination, a retake is permissible following a 90 day period. Examinations may be retaken any number of times, however, an examination processing fee is required each time the entire exam is retaken, or if only one part is retaken, (available at

<http://www.narte.org/h/fees.asp>).

Basic Exam Strategy

The iNARTE ESD examination is open book. Study/reference materials recommended for the exam are listed on Page 4.

The ESD Exam consists of two sections of 48 questions.

You must answer no more than 40 of the 48 questions on each part of the exam.

Review all questions, then answer those you are most sure of first.

You will be graded on the first 40 questions you answer. For example: if you answer Questions numbered 1 through 43 in error, you will be graded on questions 1 through 40 only.

ESDC Examination Subjects

ESDC Engineer Examination Subjects	ESDC Technician Examination Subjects
ESD Program Design & Management	ESD Program Design & Management
ESD Loss Analysis	ESD Loss Analysis
ESD Theory	ESD Theory
Math/Physics	Math/Physics
Safety	Safety
Standards/Specifications	Standards/Specifications
Terminology	Terminology
System Test & Measurement	System Test & Measurement
Workstations	Workstations
Flooring	Flooring
ESD Shielding Analysis	ESD Shielding Analysis
Equipment Design	Body Charge Eval & Control
Intersystem & Intrasystem Design	Materials Test & Measurement
Body Charge Eval & Control	Manufacturing/Repair Facility
Materials Test & Measurement	Eval, Survey & Auditing
ESD Prediction (Devices & Systems)	Plant Equipment ESD Control & Evaluation
ESD Analysis (Devices & Systems)	Clean Room Equipment & Material Control
Manufacturing/Repair Facility	Garment Control & Evaluation
Eval, Survey & Auditing	Mfg Plant Handling Procedures
Plant Equipment ESD Control & Evaluation	ESD Control Material In-Field Testing
Clean Room Equipment & Material Control	Production Aids & Tool Eval
Garment Control & Evaluation	Ionization Devices & Systems
Mfg Plant Handling Procedures	Grounding Technology
ESD Control Material In-Field Testing	Laboratory Test & Analysis of ESDC Packaging
Production Aids & Tool Eval	Materials
Ionization Devices & Systems	In Field ESD Controls
In Field ESD Controls	
Device Sensitivity Test & Measurement	
Grounding Technology	
Laboratory Test & Analysis of ESDC Packaging Materials	

Application Instructions

1. APPLICATION (Page 5-6): Complete the application form and submit to iNARTE headquarters with the non-refundable Engineer or Technician application fee. When both application and fees are received, iNARTE will begin to compile the application file and schedule testing.

Upon signing the application form, you agree to abide by the iNARTE Code of Ethics as printed in the iNARTE Membership Handbook and online at <http://www.narte.org/h/codeofethics.asp>

2. TESTING: iNARTE will coordinate the necessary arrangements for a testing date and time at the location chosen by applicant. Authorized Testing Center listings are available from iNARTE HQ or online at <http://www.narte.org/h/testcenters.asp>. Examinations are graded at iNARTE Headquarters and the applicant will be advised of a pass/fail within 10 working days by mail or they may call Headquarters for their results. Passing score is 70%. Should a candidate fail the examination, a retake of either or both parts is permissible following a **90 day** period. Examinations may be retaken any number of times, however, an examination processing fee is required each time the complete exam is taken or when only one part is retaken, (available at <http://www.narte.org/h/fees.asp>).

3. DETAILED WORK HISTORY FORM (Pages 7-8): Provide detailed evidence of experience in the appropriate field using a current resume, or the iNARTE Detailed Work History Form. Some credit for college education/degrees may be awarded based on review of official transcripts.

4. REFERENCES (Reference Form Pages 9-10): Initiate action with those individuals who will serve as references. Using the reference form provided (**Pages 9-10**), these individuals must attest to the applicant's competency at the certification level requested and also serve as character references. One Reference must be from a supervisor. Reference forms should be sent to iNARTE headquarters.

5. EVIDENCE OF EDUCATION & TRAINING: Evidence of completing courses of study or training programs in related areas as offered by educational institutions and/or through internal corporate training programs are given consideration as part of certification. Official school transcripts may be required for experience credit. Photocopies of applicable training certificates may be submitted.

7. QUESTIONS (Page 11-12): Submit ten (10) original multiple choice questions with correct answers and supporting references. These must be written in your own words. Questions that relate to real world workplace engineering or technical/testing situations are preferred. Questions must conform to the format outlined on the iNARTE question form (**Page 11-12**).

Notes about the Application Process

Once any component of your application package is received, iNARTE will begin to compile your file.

You will receive updates on the progress of your application by mail every 6 weeks, or you may contact us to check on the status of your file at **+1-800-89-NARTE**.

Application Checklist

- Application
- Eng or Tech Fee (non-refundable)
- Detailed Work History
- 1 Supervisor reference
- 2 Peer references
- 10 questions
- Transcripts/certificates

Once the application form and fees are received, iNARTE will initiate examination scheduling.

Reference forms should be sent *directly* to iNARTE headquarters. from the reference provider by mail.

All Envelopes containing Applications and Forms shall be clearly marked for **iNARTE Certification**

All application materials should be sent by mail to:

iNARTE, Inc. 840 Queen Street, New Bern, NC 28560, USA

Forms may be faxed to +1 252-672-0111, Contact iNARTE with any questions at 1-800-89-NARTE

INSTRUCTIONS

Print or type answers completely. You may submit your current resume in lieu of completing the Detailed Work History Form. Make sure it contains all information required, clearly stated so that iNARTE may determine whereby you meet the requirements. Use additional sheets, as necessary. Your work record must be continuous. Mail completed application and fee to iNARTE headquarters.

In addition to the application form, you will need three Reference Request Letter Forms. Complete the Reference Request Letters and mail them plus a copy of your work experience to each person you listed as a reference. These references should be familiar with your work experience and be in positions of responsibility in the field of ESDC Engineering or Technology.

REQUIREMENTS FOR CERTIFICATION AS AN ESDC ENGINEER

9 years of engineering experience*, or equivalent based on a combination of education and ESDC work experience, which demonstrated competence in ESDC engineering.

Satisfactory performance on a written exam in ESDC engineering fundamentals as administered by iNARTE.

Equivalencies granted for study at schools approved by iNARTE are based on the schedule below. Engineering teaching experience may qualify the applicant for up to two years of experience equivalency.

Education	Curriculum	Equivalency
1-4 years undergraduate study without degree	Engineering	1 year of each year of study; maximum of 4 years
BS	Engineering of physical science	4 years
BSET	Engineering technology	2 years
BS/BA	Other than above	2 years
Postgraduate study	Engineering or physical science	Up to one year

REQUIREMENTS FOR CERTIFICATION AS AN ESDC TECHNICIAN

6 years of technician experience*, or equivalent based on a combination of education and ESDC work experience, which demonstrated competence as an ESDC technician.

Satisfactory performance on a written exam in ESD technology as administered by iNARTE.

Two years of experience may be granted for graduation from an iNARTE-approved school in a curriculum that includes an electronics technology or applied electronics course. The teaching of electronics or engineering technology may qualify the applicant for up to two years of experience equivalency.

TRANSCRIPTS: For post-secondary school work equivalencies you must have official transcripts sent to iNARTE by the Institution you attended. The registrar's office should be able to give you information on this procedure.

*Experience records will be reviewed by iNARTE. The mere execution of work designed by an ESDC Engineer or the supervision of such work is not considered to be the practice of engineering.

Requested Test Center: _____
Indicate Symposium dates, or see listing at <http://www.narte.org/h/testcenters.asp>

Test Month/Date Requested: _____

Additional Contributions: Include title and dates of any published papers; recognized contributions to the Scientific or engineering profession; contributions to wireless installation technical or engineering courses in a "school of recognized standing".

TECHNICAL/PROFESSIONAL AWARDS

TECHNICAL/PROFESSIONAL LICENSES

PROFESSIONAL SOCIETY AFFILIATIONS & GRADES OF MEMBERSHIP

Applicant' s Signature _____

Date _____



Reference Form for ESDC iNARTE Certification – FORM MAY BE PHOTOCOPIED
INTERNATIONAL ASSOCIATION FOR RADIO,
TELECOMMUNICATIONS AND ELECTROMAGNETICS, INC.
 840 Queen Street, New Bern, NC 28560 1-800-89-NARTE or 1-252-672-0111

Applicant's Name _____ Address: _____ Date: _____
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Dear _____ (Name of Reference)

I have applied for certification in the field of Electrostatic Discharge Control, and request that you serve as one of the references on my application. If you are willing to do so, please provide the information requested on this form and return the form direct to iNARTE at 840 Queen Street, New Bern, NC 28560, USA. The certification requirements for ESDC Engineer and ESDC Technician are quoted below and I have enclosed a copy of my work experience.

Thank you for your help. Please send the completed forms to iNARTE at your earliest convenience. iNARTE will not process my application until all references submit their forms.

Signature of Applicant _____

Date of Application to iNARTE _____

REQUIREMENTS FOR CERTIFICATION AS AN ESDC ENGINEER

9 years of engineering experience*, or equivalent based on a combination of education and ESDC work experience, which demonstrated competence in ESDC engineering.

Satisfactory performance on a written exam in ESDC engineering fundamentals as administered by iNARTE.

Equivalencies granted for study at schools approved by iNARTE are based on the schedule below. Engineering teaching experience may qualify the applicant for up to two years of experience equivalency.

Education	Curriculum	Equivalency
1-4 years undergraduate study without degree	Engineering	1 year of each year of study; maximum of 4 years
BS	Engineering of physical science	4 years
BSET	Engineering technology	2 years
BS/BA	Other than above	2 years
Postgraduate study	Engineering or physical science	Up to one year

REQUIREMENTS FOR CERTIFICATION AS AN ESDC TECHNICIAN

6 years of technician experience*, or equivalent based on a combination of education and EMC work experience, which demonstrated competence as an EMC technician.

Satisfactory performance on a written exam in EMC technology as administered by iNARTE.

Two years of experience may be granted for graduation from an iNARTE-approved school in a curriculum that includes an electronics technology or applied electronics course. The teaching of electronics or engineering technology may qualify the applicant for up to two years of experience equivalency.

*Experience records will be reviewed by iNARTE. The mere execution of work designed by an ESDC Engineer or the supervision of such work is not considered to be the practice of engineering.

INARTE ESDC CERTIFICATION REFERENCE FORM Page 2– This Form May Be Duplicated

Name of Applicant _____

Do you know the applicant well? _____ Casually? _____ How Long? _____

What is your professional relationship to the applicant? _____

Has the applicant been engaged as an ESDC Engineer ____ or ESDC Technician ____ for one year prior to "Date of Application"? (Candidate is eligible for certification even if they are not currently practicing their craft.)

Check the areas for which this applicant qualifies:

_____ ESDC Engineer _____ ESDC Technician _____ Both

Please evaluate the applicant in the space below:

ENG TECH

_____ _____ Exceptionally well qualified

_____ _____ Well qualified

_____ _____ Marginally qualified

_____ _____ Unqualified (explain below)

_____ _____ Number of year' s experience
(Based on your personal knowledge)

Engineer or Technician?

Engineers know the math and the physics of ESDC. Technicians know the instruments and test setups. Engineers need good writing and verbal skills. Technicians need to know the pitfalls of real measurements.

Additional comments:

Your name (print) _____

Your business or affiliation _____

Your street address _____

Signature _____

Date _____



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840 Queen Street, New Bern, NC 28560 1-800-89-NARTE or 1-252-672-0111

ESD CERTIFICATION QUESTION SUBMISSION FORM

The following format must be used. This form may be copied and used for each question.

Name: _____

FOR OFFICE USE ONLY

Record Number: _____

Date: _____

INSTRUCTIONS:

One of the criteria required for application for ESDC certification is the submission of ten original multiple-choice questions relating to ESDC. These questions should be submitted in electronic form using the format outlined in steps a to g below. Send completed questions by email or on disk to: iNARTE, 840 Queen Street, New Bern, NC 28560, USA.

SAMPLE QUESTION

1. To which of the following should you ground work surface mats?
- a. A water pip
 - b. A steel girder
 - c. Common-point ground
 - d. The adjacent work surface mat

Answer: C For: E & T Time: 5 Minutes Reference: Title of Book, page No. etc. Category: **O**) Grounding Technology

Question _____ of 10

a. Question: (Try to avoid any possible misinterpretations of the question. If question is negative, i.e., "Which item does **NOT** include the following?", the **NOT** should be bolded and capitalized.)

b. Answers: (Only 4 answers) {Include all calculations if the answer is calculated}

- A.
- B.
- C.
- D.

c. Correct Answer:

d. Applicability _ Engineer _ Technician _ Both

e. Time required to answer the question: Minutes

f. Reference(s)

g. Category (See list on page 12)

Notes on Question Content

The questions you submit must be in your own words.
 Questions that relate to real-life work situations or problems are desirable (see example above).
 Questions should be challenging, yet answerable by a knowledgeable and experienced ESDC practitioner.
 Your questions should be geared toward the certification type for which you are applying (Technician or Engineer).

CATEGORIES OF ESD QUESTIONS

- A) Body Charge Evaluation & Control
- B) Clean Room Equipment & Material Control
- C) Control & Evaluation
- D) Device Sensitivity Test & Measurement
- E) Equipment Design
- F) ESD Analysis (Devices & Systems)
- G) ESD Control Material In-Field Testing
- H) ESD Prediction (Devices & Systems)
- I) ESD Program Design & Management
- J) ESD Loss Analysis
- K) ESD Shielding Analysis
- L) ESD Theory
- M) Flooring
- N) Garment Control & Evaluation
- O) Grounding Technology
- P) In Field ESD Controls
- Q) Intersystem & Intrasystem Design
- R) Ionization Devices & Systems
- S) Laboratory Test & Analysis of ESDC Packaging
- T) Materials
- U) Manufacturing Plant Handling Procedures
- V) Manufacturing/Repair Facility Evaluation, Survey & Auditing Plant Equipment ESD
- W) Materials Test & Measurement
- X) Math/Physics
- Y) Production Aids & Tool Evaluation
- Z) Safety
- AA) Standards/Specifications
- BB) System Test & Measurement
- CC) Terminology
- DD) Workstations

REFERENCE RECOMMENDATIONS

Standards/Specifications

ESD Association Advisories and Standards (All)
EIA-RS-471
EN 61000-4-2
JESDD 625
SEMI E43-35

Books (Primary references)

Electrostatics Niel Jonnason
Physics Texts
SEMI E78-0998

Books (Secondary References)

Electromagnetic, Theory E. Hallen - London, 1962
Electrostatic Discharge and Electronic equipment, Warren Boxleitner, 1989
Electrostatic Discharge Control, Owen J. McAteer
Electrostatic Discharge, Michael Mardiguien, 1986
EMC by Design, Oren Hartal, 1991-96
ESD Control A to Z, J Kolyer/D Watson, 1995
ESD Program Management, Dangelmayer, 1990
Handbook of Electrostatic Processes, Jeu-Shih Champ/Arnold J. Kelly
High Frequency and Noise in Electr. Circuits, D.C. Smith VanNorshrest, Reinhold, 1982
IEEE Symposiums
Journal of Electrostatic, Elsevier Company ISSN 0304-3886
Noise Reduction Techniques in Electronic Systems, Henry W. Ott
Reliability Engineering Theory & Practice, 3rd Edition, A. Birolin - Springer Verlag, 1999
Static and Dynamic Electricity, W.R. Smythe - McGraw Hill 1968
Static Electrification, British Journal of Applied Physics, 1953
Static Electrification, L.B. Loeb, 1957
Engineering Calculations Study Guide, Dr. Donald G. Pierce, 2000
TR-1 Can electricity be measured, Niels Jonassen
Basic ESD and I/O Design, Maloney
ESD in Silicon IC, Duvvury

Other

EOS/ESD Symposium Tutorials