



AUTOMOTIVE SERVICE General Service Technician

**NATEF
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ASE PROGRAM CERTIFICATION STANDARDS
FOR
GENERAL SERVICE TECHNICIAN PROGRAMS

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POLICIES

GENERAL SERVICE TECHNICIAN CERTIFICATION PROGRAM

The General Service Technician Program was developed as an *additional option* for articulated certification, intended to serve secondary programs in areas where the local employers prefer to hire graduates who have a broad skill set and general understanding of all automotive systems rather than skill sets with greater depth in fewer automotive systems. The input and advice of each school's program advisory committee is critical to the decision about which certification option is most appropriate for that program and its students. In 2006 the General Service Technician Program was expanded to include programs at post-secondary schools.

The Board of the National Institute for Automotive Service Excellence (ASE) is the body responsible for the General Service Technician Certification Program. ASE will grant certification to programs that comply with the evaluation procedure, meet established standards, and adhere to the policies in this document.

The Certification Program is under the direct supervision of the Board of Trustees of the National Automotive Technicians Education Foundation (NATEF) and such personnel designated or employed by the Foundation.

The purpose of the General Service Technician Certification Program is to improve the quality of training offered at the secondary and post-secondary level. NATEF does not endorse specific curricular materials nor provide instruction to individuals, groups or institutions. It does, however, set national standards for the content of instruction, which includes tasks, tools and equipment, hours, and instructor qualifications.

The Program is a certification program only and is not associated with the accreditation role of other agencies.

The cost to each program for certification will be as reasonable as possible to encourage program participation. This cost will include self-evaluation materials, application (processing) fee, on-site team evaluation materials, and the honorarium and expenses of the Evaluation Team Leader (ETL).

For General Service Technician Program application documents, please order an automobile certification manual.

CERTIFICATION PROCESS

Program Self-Evaluation

The certification process begins with an extensive self-evaluation performed by training program instructors, administrators, and advisory committee members. Members of this group compare the program to national standards, and have the opportunity to make improvements before submitting evaluation documents to NATEF.

NATEF Review

Self-evaluation materials are then sent to NATEF, where they are reviewed to determine if the program qualifies for an on-site team evaluation.

On-Site Evaluation

If the program qualifies, an Evaluation Team Leader (ETL), an educator certified by ASE and trained by NATEF, is assigned to the program and an on-site visit is conducted.

Recommendation for Certification

When industry requirements are met, the program will become certified for a period of five years.

Programs will have a maximum of 18 months to complete the certification process from the date that their Application for Certification or Recertification is received by the NATEF office. Any ASE-certified program that has let their certification lapse for two or more years will be required to follow the procedures for initial certification when they apply for renewal of their certification. *Please note: A program must complete the entire recertification process within the two-year window.*

GENERAL SERVICE TECHNICIAN STANDARDS STATEMENTS

STANDARD 1 – PURPOSE

The General Service Technician Program should have clearly stated program goals, related to the needs of the students and employers served.

STANDARD 2 – ADMINISTRATION

Program administration should ensure that instructional activities support and promote the goals of the program.

STANDARD 3 – LEARNING RESOURCES

Support material, consistent with both program goals and performance objectives, should be available to staff and students.

STANDARD 4 – FINANCES

Funding should be provided to meet the program goals and performance objectives.

STANDARD 5 – STUDENT SERVICES

Systematic pre-admission testing, interviews, counseling services, placement, and follow-up procedures should be used.

STANDARD 6 – INSTRUCTION

Instruction must be systematic and reflect program goals. A task list and specific performance objectives with criterion-referenced measures must be used.

STANDARD 7 – EQUIPMENT

Equipment and tools used must be of the type and quality found in the repair industry and must also be the type needed to provide training to meet the program goals and performance objectives.

STANDARD 8 – FACILITIES

The physical facilities must be adequate to permit achievement of the program goals and performance objectives.

STANDARD 9 – INSTRUCTIONAL STAFF

The instructional staff must have technical competency and meet all state and local requirements for certification.

STANDARD 10 – COOPERATIVE AGREEMENTS

Written policies and procedures should be used for cooperative and apprenticeship training programs.
(This applies to programs that offer cooperative/apprenticeship training.)

GENERAL SERVICE TECHNICIAN MINIMUM REQUIREMENTS

1. The minimum program requirements are identical for initial certification and for recertification.
2. A program providing instruction must have a minimum total of 500 hours of combined laboratory/shop (co-op) and classroom instruction.
3. **The average rating on each of Standards 6, 7, 8, and 9 must be a four** on the five-point scale. The program will not be approved for an on-site evaluation if the average is less than 4 on any of those standards. The program should make improvements before submitting the application to NATEF for review. **A program will be denied certification if the on-site evaluation team average on Standards 6, 7, 8, or 9 is less than four.**
4. A program may not be approved for an on-site evaluation if the average rating on Standards 1- 5 and 10 is less than a four on the five-point scale. **A program may be denied certification if the on-site evaluation team average on Standards 1 - 5 and 10 is less than four.** Approval for on-site evaluation or certification will be made by NATEF, based on the number of standards rated at 4 or 5 as well as the individual rating on any standard rated less than four.
5. All instructors must hold current ASE certification in Suspension & Steering (A4), Brakes (A5), Electrical/Electronic Systems (A6), and Engine Performance (A8).
6. All instructors must attend a minimum of 20 hours per year of recognized industry update training.
7. The program Advisory Committee must conduct at least two working meetings a year and have a minimum of 5 people (excluding school personnel) on the committee. Minutes of the meetings must be provided for review by the on-site evaluation team and must reflect relevant areas of the standards as having been considered by the Advisory Committee.
8. Programs must teach **all** (100%) of the tasks on the Task List.
9. All programs must have an Articulation Agreement with an ASE-certified Automobile Technician Training Program at the post-secondary level to encourage students to continue training after completing the General Service Technician Program.
10. The concern for safety is paramount to the learning environment. Each program must conform to the following safety requirement:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

INFORMATION ABOUT EVALUATION TEAM LEADERS (ETLs)

Evaluation Team Leaders (ETLs) are educators who have been trained by NATEF to lead the on-site evaluation. The NATEF office will assign an ETL once a program has been approved for an on-site evaluation. Every effort will be made to assign an ETL located close to the school to reduce the cost for the evaluation. Three additional team members, selected by the program and approved by the ETL, are required for a general service technician program on-site evaluation (see the following page for additional information about team members and on-site teams).

Persons selected as ETLs must:

1. have a minimum of six years of combined experience as an automobile technician and automobile instructor (at least three years experience as an automobile technician is required);
2. have a B.A. or B.S. in Education from a college or university recognized for teacher training by the state; and
3. be a current ASE-certified master automobile technician (A1-A8) credentials.

Or, if a state does not require automobile instructors to have a B.A. or B.S. degree, the following qualifications will apply:

1. six years experience as an automobile technician;
2. four years automobile teaching experience at the secondary or post-secondary level; and
3. current ASE-certified master automobile technician (A1-A8) credentials.

ETL candidates who are active instructors must be directly associated with a certified program. ETL candidates who are inactive instructors must have formerly been directly associated with a certified program. **Inexperienced ETLs must serve as an evaluation team member or observer for an initial on-site evaluation prior to acting in the capacity of an ETL.**

ETL training is valid for three years. However, automatic three-year renewal is granted every time an ETL conducts an on-site evaluation. ETLs are required to attend additional training sessions or serve as a team member if they have not conducted an on-site evaluation within three years. This additional training is required even though the individual holds current ASE certification.

Anyone interested in becoming an Evaluation Team Leader should contact the NATEF office at (703) 669-6650 or their state Trade & Industrial Supervisor for more details.

INFORMATION ABOUT ON-SITE EVALUATION TEAMS

The program requesting certification is responsible for recruiting and recommending on-site evaluation team members. The ETL must approve individuals recommended by the program. The on-site evaluation team members must be practicing automobile technicians, service managers or shop owners from businesses in the area served by the training program. For initial certification only, one team member may be an automobile instructor from another school district/system*.

Team members must have:

1. a high school diploma or the equivalent (industry or military training may be considered as the equivalent), and
2. at least seven years full-time experience as a general automobile technician.

ASE automobile certification is recommended but not required.

* An automobile instructor from another school district/system must have a minimum total of seven years experience, which must include three or more years full-time experience as an automobile technician and three or more years of post high school training.

The **initial** certification evaluation team is composed of four individuals: the ETL and three team members. Two team members must be from industry (one from a dealership and one from an independent repair facility). The third member may be from one of the following: a dealership, an independent repair facility or an automobile training program.

The **recertification** evaluation team is composed of three individuals: the ETL and two team members. One team member must be from a dealership and one team member must be from an independent repair facility.

Each program requesting initial certification or recertification must identify their choices for evaluation team members on the On-Site Evaluation Team Member List. An alternate team member choice must be identified on the On-Site Evaluation Team Member List in the event that one of the team members is unable to conduct the on-site evaluation. **The alternate team member must be from either a dealership or from an independent repair facility.**

Team members must not be advisory committee members, former instructors, or graduates of the program within the past ten years.

**NATEF reserves the right to add an additional team member to an on-site evaluation team to fulfill ETL training requirements (inexperienced ETLs are required to serve as a team member before serving as an ETL).*

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TASK LIST INFORMATION

An essential element of any curriculum or training program is a valid task list. Instructors must use the General Service Technician Program task list to serve as a solid base for course of study outlines and to facilitate communication and articulation of their training program with other institutions.

It is NATEF policy that the task list developed by the National Institute for Automotive Service Excellence (ASE) serves as the basis for the NATEF task list. Panels of technical service experts from the automotive service industry and vocational education are called upon to develop and validate the ASE and NATEF task lists.

Additional information on the development of the NATEF task list can be found in the Task List section.

TOOLS AND EQUIPMENT INFORMATION

The basic hand tools and general lab/shop equipment that must be available for use in the general service technician program are listed in the Tools and Equipment section. The specialty tools and equipment that must be available are also listed in the Tools and Equipment section.

Although no brand names are listed, the equipment and tools must address the following programmatic issues:

1. Safety - Equipment and tools must have all shields, guards, and other safety devices in place, operable, and used.
2. Type and Quality - The tools and equipment used in a certified program must be of the type and quality found in industry. They must also be adequate and in sufficient quantity to meet the program goals and student performance objectives.
3. Consumable Supplies - Supplies should be in sufficient quantity to assure continuous instruction. Consumable supplies, such as solvents, sand paper, etc. are not listed.
4. Maintenance - A preventive maintenance schedule should be used to minimize equipment down time.
5. Replacement - A systematic schedule for replacement should be used to maintain up-to-date tools and equipment at industry and safety standards. Information gained from student program evaluations as well as advisory committee input should be used in the replacement process.
6. Inventory - An inventory system should be used to account for tools, equipment, parts, and supplies.
7. Parts Purchasing - A systematic parts purchasing system should be used - from work order to supplier.
8. Hand Tools - Each student should be encouraged to purchase a hand tool set during the period of instruction.
9. Storage - Adequate storage of tools should be provided. Space for storage of the students' hand tools should be provided.

GENERAL SERVICE TECHNICIAN PROGRAM EVALUATION

NATEF Standards for Initial Certification and Recertification are identical. Items in **bold** print in the General Service Technician Program Self-Evaluation materials are critical for certification. These items are:

- 2.5 A** Does the Advisory Committee convene a minimum of two working meetings per year?
- 5.5 F** Does the Advisory Committee review information from the annual follow-up procedure and provide input for modifications to the training program?
- 6.5 A** Does the program provide theory and “hands-on” training for 100% of the tasks on the task list?
- 6.5 B** Are the tools and equipment available for the tasks taught?
- 7.1 A** Rate the degree to which all shields, guards, and other safety devices are in place, operable, and used.
- 7.1 B** Rate the degree to which all students, instructors, and visitors wear safety glasses in the lab/shop area while lab is in session.
- 9.1 E** Do instructors hold current ASE certification in: A4, A5, A6, and A8?
- 9.3 B** Do instructors attend a minimum of 20 hours per year of recognized industry update training?

Additionally, programs must meet the 500 minimum total hour requirement.

Programs must be able to support a yes response for all eight items. **If these responses are not achieved, do not apply for certification at this time.**

In addition, an on-site evaluation will not be scheduled unless the average score on each of Standards 6, 7, 8, and 9 is at least a 4 on the General Service Technician Program Self-Evaluation. Please refer to the General Service Technician Program Requirements for more information.

Instructors must be ASE certified in Suspension & Steering (A4), Brakes (A5), Electrical/Electronic Systems (A6), and Engine Performance (A8). Please refer to item 4 on page 4.

NATEF POLICIES ON ARTICULATION AGREEMENTS

The General Service Technician Program was developed as an option for secondary programs that choose to certify as articulated programs. NATEF Trustees recognized that graduates from a General Service Technician Program would have the opportunity to learn skills valuable for employment immediately upon graduation from high school. In 2006 the General Service Technician Program was expanded to include programs at post-secondary schools. However, the Trustees further recognized that General Service Technician Program graduates should be encouraged to continue their training at an ASE-certified Automobile Technician Training Program (post-secondary). For this reason, articulation is **required** for all General Service Technician Programs.

Articulation agreements are intended to encourage, but cannot require, General Service Technician Program graduates to go on to post-secondary education. Financial and social considerations suggest that many graduates must seek employment upon graduation.

The articulation agreement must be in writing and approved by the administration of each institution. The agreement shall:

- a. Stipulate how credit* will be granted for successful completion of instruction. This should also include the criteria for evaluating successful completion.
- b. Describe procedures for applying for credit* at the post-secondary level for instruction received in the General Service Technician Program.

* Credit is defined as a form of recognition for work that has been completed. It includes, but is not limited to, granting: academic credit, advanced placement, task completion, etc.

**** A SIGNED COPY OF THE ARTICULATION AGREEMENT MUST BE SUBMITTED WITH THE SELF-EVALUATION MATERIALS. ****

The procedures are as follows:

- a. The Program will submit the self-evaluation materials along with a signed copy of the articulation agreement with an ASE certified post-secondary program.
- b. The on-site evaluation team members will only evaluate the materials from the program certifying as a General Service Technician Program.
- c. The ASE-certified Automobile Program (post-secondary) will NOT be required to be evaluated until that program is due to recertify.

RECOGNITION FOR CERTIFICATION

A program approved for certification will receive a plaque that bears the ASE seal, the school's name, and the expiration date of certification. A statement will read:

"THE INSTRUCTION, COURSE OF STUDY, FACILITIES, AND EQUIPMENT OF THIS INSTITUTE HAVE BEEN EVALUATED BY THE NATIONAL AUTOMOTIVE TECHNICIANS EDUCATION FOUNDATION AND MEET THE NATIONAL INSTITUTE FOR AUTOMOTIVE SERVICE EXCELLENCE STANDARDS OF QUALITY FOR THE TRAINING OF GENERAL AUTOMOBILE SERVICE TECHNICIANS IN THE FOLLOWING AREA:"

Institutions receiving ASE certification are encouraged to put the following statement on the graduate's diploma or certificate:

"The person holding this diploma has participated in a General Service Technician Program that was certified by the National Institute for Automotive Service Excellence."

A screened ASE/NATEF logo may be overprinted with the above statement and placed on the graduate's diploma. A camera-ready logo is provided in the promotional materials a program receives upon certification.

A program approved for recertification will receive a plate that reads "RECERTIFIED Exp. 20__".

Certified programs will also receive a 24"x30" sign indicating that the training program is ASE-certified.

APPLIED ACADEMICS RECOGNITION

The NATEF Board of Trustees and the ASE Board of Directors has initiated a process to recognize ASE certified programs that are integrating academics and technical skills into the curricula. This effort should be a collaborative effort between the automotive instructors and the academic instructors in language arts, mathematics, and science.

ASE and NATEF will issue a certificate of excellence to those programs that provide documentation including, but not limited to, student assignments or activities, classroom/lab instructional materials, student performance records, and interviews with academic instructors.

Programs that wish to receive recognition must complete the Applied Academics Recognition form and return it with the application for certification or recertification. Documentation on applied academics activities must be available for the ETL at the time of the on-site evaluation.

Programs may receive recognition in Language Arts, Mathematics, Science, or any combination of the three areas.

To receive a copy of the *Applied Academics and Workplace Skills for Automobile Technicians* manual, please contact the NATEF office.

APPEALS AND ACTION FOR REVOCATION
APPEALS: PROGRAMS APPLYING FOR CERTIFICATION

A complaint received from any school concerning the procedures, evaluation or certification of the General Service Technician Program must be made in writing to the ASE office in Leesburg, VA. It will be immediately referred to the Grievance Examiner who will acknowledge receipt of the complaint in writing to the complainants. Thereafter, the Grievance Examiner will investigate the complaint and prepare a report. A copy of the report will be given to the complainants and to an Appeals Committee within thirty (30) days of the receipt of the complaint.

The Appeals Committee will review the findings and recommendations of the Grievance Examiner, together with the complaint and any data supplied in connection therewith. The Appeals Committee will be empowered to dismiss the matter or to initiate such action as it may deem appropriate.

If the complainants desire to review the Appeals Committee's evaluation, they may do so at the office of the Grievance Examiner in Leesburg, VA. However, they will not be permitted to make copies of the results.

ACTION FOR REVOCATION: ASE-CERTIFIED PROGRAMS

The Appeals Committee will also advise the ASE President of its judgments and recommendations for action in any cases of malpractice or misrepresentation involving the misuse of ASE certification for a General Service Technician Program. Upon receipt of a complaint alleging misuse or misrepresentation by a certified program, the Grievance Examiner will be notified. The Grievance Examiner will notify the parties against whom the complaint has been filed, in writing, indicating the alleged wrongdoing. The parties will be further advised that they may submit a written explanation concerning the circumstances of the complaint within thirty (30) days. After the Grievance Examiner has considered the complaint and received the explanation, if any, the Grievance Examiner will determine whether there is a reasonable basis for a possible wrongdoing. If the Grievance Examiner finds such a basis, the Grievance Examiner will inform the parties of the findings. At that time, the Grievance Examiner will inform the parties of their right to a hearing before the Appeals Committee. The parties will have fifteen (15) days to notify the Grievance Examiner, in writing, of their decision.

In the event the involved parties elect to be bound by the findings of the Grievance Examiner without a hearing, the Grievance Examiner will submit a written report with recommendations to the Chair of the Appeals Committee. This report will be submitted within sixty (60) days of the receipt of the waiver of a hearing. The Chair of the Appeals Committee will mail a copy of the Grievance Examiner's findings and recommendations to the parties. In the event that the involved parties elect to appear at a hearing, the Chair of the Appeals Committee will call a Board of Inquiry. This Board will consist of four ASE Board members, one from each of the following categories: Education, Public Interest, Service Employers, and Vehicle and Service Products Manufacturers. The Board of Inquiry will be convened in Leesburg, VA at a date and time determined by the Chair. The Board will notify the involved parties, in writing, regarding the time and place of the hearing.

The Grievance Examiner will be responsible for investigating and presenting all matters pertinent to the alleged wrongdoing to the Board of Inquiry. The involved parties will be entitled to be at the hearings with or without counsel. The parties will be given an opportunity to present such evidence or testimony as they deem appropriate.

The Board of Inquiry will notify the Chair of the Appeals Committee of its findings and recommendations in writing within ten (10) days after the hearing is completed.

The Appeals Committee will review the findings and recommendations of either the Grievance Examiner if a hearing was waived, or the Board of Inquiry if a hearing was held. The Appeals Committee will determine if the record on the complaint supports a finding of conduct contrary to or in violation of reasonable practices. If two-thirds of the Appeals Committee so find, the Committee will recommend to the President of ASE appropriate sanctions or courses of action against the parties charged.

DEFINITIONS – EDUCATIONAL TERMS

1. **AREA(S)**: Relates to one or more of the following: (1) Automatic Transmission/Transaxle, (2) Brakes, (3) Electrical/Electronic Systems, (4) Engine Performance (including emission control systems), (5) Engine Repair, (6) Heating and Air Conditioning, (7) Manual Drive Train and Axles, (8) Suspension and Steering.

2. **ARTICULATION**: A formal written agreement, usually between a secondary and post-secondary institution that are geographically within a reasonable daily commuting distance of each other. The agreement will clearly denote that students completing specific secondary courses in accordance with predetermined performance criteria will have partially completed commensurate requirements for a completion certificate or diploma awarded by the post-secondary institution. Commensurate requirements could be in the form of credit equivalents, advanced placement, task completion, etc. at the post-secondary institution.

3. **CURRICULUM**: All the objectives of the lesson plan with respect to the content and learning activities, arranged in a sequence for a particular instructional area. An orderly arrangement of integrated subjects, activities, time allocations, and experiences that students pursue for the attainment of a specific educational goal.

4. **COMPETENCY**: (Hands-On) - Performance of task to the level or degree specified in the performance standard and curriculum for the task.

5. **COMPETENCY**: (Written) – Understanding of task to the level or degree specified in the performance standard and curriculum for the task.

6. **CRITERION-REFERENCED MEASURE(S)**: An exercise based on a performance objective for a task, and designed to measure attainment of that objective. (Also called performance test(s) or criterion-referenced test.)

7. **GOAL**: A statement of the intended outcome of participation in the training program.

8. **MASTERY**: (See Competency – Hands-On and Competency - Written).

9. **OBJECTIVE, PERFORMANCE**: A written statement describing an intended outcome (competent task performance) in terms of student performance. (Also called "behavioral" objective or instructional objective) R.F. Mager Associates, 13245 Rhoda Drive, Los Altos Hill, California.

10. **ON-VEHICLE SERVICE AND REPAIR WORK**: The processing, assignment and student performance of the appropriate tasks on vehicles donated by manufacturers or other sources, customer-owned, and other training vehicles.

11. PERSONAL CHARACTERISTIC: Attributes that are not readily measurable, and are generally in the affective domain.

12. STANDARD: "...Something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value, quality, etc." Webster's New World Dictionary (1991)

13. STANDARD – (PERFORMANCE): A written specification of the results of acceptable task performance.
14. STANDARD – (PERSONAL): An attribute or characteristic of an individual that facilitates entry into, or advancement within an occupation.
15. STANDARD – (PROGRAM): A specific quality or desired characteristic of a training program designed to prepare individuals for employment or advancement.
16. TASK: A unit of work activity which has an identifiable beginning and ending point in its accomplishment, and consists of one or more measurable steps.
17. TRAINING STATION: An area with appropriate tools and equipment, large enough to allow the development of both safety and competency in task performance.

Must or shall is an imperative need, duty or requirement; an essential or indispensable item; mandatory.

Should is used to express a recommendation, not mandatory but attainment would increase program quality.

May or could expresses freedom to follow a suggested alternative.

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PROCEDURES FOR CERTIFICATION/RECERTIFICATION

Process Overview

NOTE: NATEF recommends that programs maintain a file containing copies of all reference and documentation materials developed during all phases of the certification process.

1. Purchase application materials

The program requesting certification must purchase self-evaluation materials from NATEF in Leesburg, VA. To begin the certification process, the program must return the following items from the evaluation materials packet:

- a. Application for Certification or Recertification
- b. Self-Evaluation Summary Sheet
- c. On-site Evaluation Team Member List
- d. Instructor Qualifications Forms
- e. Instructor Training Forms
- f. Advisory Committee List
- g. Articulation Agreement
- h. Applied Academics Recognition Forms (optional)
- i. Purchase Order, Check, or Credit Card Authorization for Application Fee and On-Site Evaluation Team Packets (self-evaluations will be returned if received without payment)

2. NATEF review of application

The national office will review the materials within 30 days. Following the review, the Program Administrator and the state Trade & Industrial Supervisor will be notified about the status of the program. The program will be identified as one of the following:

- a. Qualified for on-site evaluation.
- b. Not qualified for an on-site evaluation at that time. NATEF will indicate specific improvements that must be made before the on-site evaluation can be scheduled.

3. Evaluation Team Leader (ETL) assigned, Program Coordinator makes contact

NATEF will assign an Evaluation Team Leader (ETL) to the program. NATEF will send the program the Application for On-site Evaluation. With a legitimate reason, the Program Coordinator may contact the NATEF office to request a different ETL. A request for a different ETL must be in writing and specific as to the reason for the request. (The ETL assigned must NOT be a present or former teacher or administrator of the program to be evaluated.) The Program Coordinator must contact the ETL to arrange a date for the on-site evaluation.

The Application for the On-site Evaluation will be sent with instructions that outline the plans for the local administration and the costs for the ETL's services and expenses. All costs will be paid by the institution requesting certification.

4. Send on-site application, course of study, and list of on-site evaluation team members to ETL

The Application for On-site Evaluation, signed by the program administrator, must be sent to the ETL. A copy of the course of study and this application must be received by the ETL at least two weeks prior to the on-site evaluation or the on-site must be rescheduled. The course of study should include the following items:

- a. Syllabus and class schedule for each class
- b. Tasks and sequence of instruction
- c. Number of contact hours
- d. List of training materials and audio-visual materials used in training
- e. Sample evaluation form used to track student progress

The On-site Evaluation Team Member List must be included for the ETL to review and approve. Once a date has been set and the on-site evaluation team members have been approved by the ETL, the program coordinator must contact the on-site evaluation team members to make arrangements for the evaluation day(s).

5. On-site evaluation

Initial certification requires 2 consecutive days while students are in class for the on-site evaluation review of all the standards.

Recertification requires a 1-day on-site evaluation while students are in class. The on-site evaluation team reviews Standards 6-9 as well as all go/no-go (critical) items. However, if the Advisory Committee average on Standards 1-5 or Standard 10 is less than 4, the on-site evaluation team must also review these standards. The NATEF office will determine whether an additional day or additional team members will be required to complete the evaluation.

6. ETL reports results to NATEF

The ETL will submit all on-site evaluation materials and a final report to NATEF with a recommendation for or against program certification.

7. Program certification

The national office will review the final report and all additional evaluation materials to determine whether the program meets the requirements for certification and will make their recommendation to the ASE Board. The ASE President will approve certification as sanctioned by the Board of Directors.

Programs that do not earn certification will be given a written report specifying improvements that must be made to qualify for certification. The decision at the national level will be final unless appealed to the ASE Board of Directors. Appeals will be heard only at regular meetings of the Board. The Program Administrator and the state Trade & Industrial Supervisor will be notified of all decisions regarding the certification status of all programs applying for ASE certification.

8. Display and reporting of certification materials

A wall plaque will be forwarded from the national office to the program administrator.

9. Certified General Service Technician Program List

The NATEF office maintains a current listing of all ASE-certified programs. The list is made available on the NATEF website.

10. Compliance report

A program will be certified for five years. A compliance report is required after 2½ years. The compliance report will be used to verify that a program is maintaining its standards. NATEF will notify the program administrator of the compliance date and will send the appropriate compliance review forms at that time. The Advisory Committee must complete the report and the program administrator must return the forms to the NATEF office.

NATEF may randomly select programs at the 2½-year period for an on-site compliance review by an ETL and NATEF Trustees, staff, consultants, or other designated representatives. The selected programs will be notified, in advance, of the on-site review by the NATEF office. Programs should be prepared to provide documentation on how they are maintaining the standards. All costs for this on-site review will be paid by NATEF.

11. Recertification

The NATEF office will contact the program six (6) months prior to the certification expiration date. Programs must formally request recertification materials and follow the process outlined above.

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**On-site Evaluation Cost Sheet
General Service Technician Program**

CERTIFICATION		RECERTIFICATION
Certification Manuals (Applied Academics general statements and workplace skills list are included)	\$75.00	\$65.00
Application Fee	\$250.00	\$250.00
On-site Evaluation Team Manuals (minimum of 4 sets for initial cert. and 3 sets for recert. @ \$50 each.)	\$200.00	\$150.00
Honorarium for Evaluation Team Leader (ETL) @ \$225/day *Please see below	\$450.00	\$225.00
<u>Estimated</u> mileage, hotel, and meal expenses for the ETL	<u>\$150.00</u>	<u>\$100.00</u>
<u>ESTIMATED TOTAL COSTS</u>	\$1125.00	\$790.00

General Service Technician Program Task List

Introduction to Auto Shop and Personal Safety

- Identify general shop safety rules and procedures.
- Utilize safe procedures for handling of tools and equipment.
- Identify and use proper placement of floor jacks and jack stands.
- Identify and use proper procedures for safe lift operation.
- Utilize proper ventilation procedures for working within the lab/shop area.
- Identify marked safety areas.
- Identify the location and use of fire blankets.
- Identify the location and the types of fire extinguishers; demonstrate knowledge of the procedures for using fire extinguishers.
- Identify the location and use of eye wash stations.
- Identify the location of the posted evacuation routes.
- Comply with the required use of safety glasses, gloves, shoes during lab/shop activities.
- Identify and wear appropriate clothing for lab/shop activities.
- Comply with appropriate hairstyles for lab/shop activities.
- Demonstrate knowledge of safety aspects of supplemental restraint systems (SRS) and antilock brake systems (ABS).
- Locate and demonstrate knowledge of material safety data sheets (MSDS).

Tools and Equipment

- Identify tools and their usage in automotive applications.
- Identify standard and metric designation.

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- Demonstrate safe handling and use of appropriate tools.
- Demonstrate proper cleaning, storage, and maintenance of tools and equipment.

Looking for Information

- Identify sources of service information
 - Locate and use paper and electronic manuals.
 - Locate and use Technical Service Bulletins (TSBs).
- Proper vehicle identification information
 - Define the purpose and use of the VIN, engine numbers, and date code.
 - Locate VIN.
 - Apply knowledge of VIN information.

Preparing Vehicle for Service

- Identify information needed and the service requested on a repair order.
- Identify purpose and demonstrate proper use of fender covers, mats.
- Demonstrate use of the three C's (concern, cause, and correction).
- Review vehicle service history.
- Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Preparing Vehicle for Customer

- Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

Basic Vehicle Service

- Check and adjust engine oil level.
- Check and adjust engine coolant level.

- Check and adjust power steering fluid level.
- Check and adjust brake fluid level.
- Check and adjust windshield washer fluid level.
- Check and replace wiper blades.
- Check and adjust differential/transfer case fluid level.
- Check and adjust transmission fluid level.
- Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
- Inspect and replace air filter.
- Determine fluid type requirements and identify fluid.

Engine Repair

- Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
- Perform oil and filter change.
- Remove and replace radiator.
- Inspect powertrain mounts; determine necessary action.

Automatic Transmission

- Service transmission; perform visual inspection of transmission; replace fluids and filters.

Manual Drive Train and Axles

- Diagnose fluid loss, level, and condition concerns; determine necessary action.
- Drain and fill transmission/transaxle and final drive unit.

- Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action.
- Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.
- Bleed clutch hydraulic system.
- Diagnose fluid leakage concerns; determine necessary action.
- Inspect and replace drive axle shaft wheel studs.
- Inspect constant-velocity (CV) joint boots.
- Remove and replace rear wheel drive drive shaft.

Suspension and Steering

- Identify and interpret suspension and steering concern; determine necessary action.
- Determine proper power steering fluid types; inspect fluid levels and condition.
- Flush, fill, and bleed power steering system.
- Diagnose power steering fluid leakage; determine necessary action.
- Lubricate suspension and steering systems.
- Inspect, remove, and replace shock absorbers.
- Remove, inspect, and install stabilizer bar bushings, brackets, and links.
- Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
- Perform pre-alignment inspection; determine necessary action.
- Measure vehicle riding height; determine necessary action.
- Diagnose tire wear patterns; determine necessary action.
- Inspect tires; check and adjust air pressure.

- Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
- Rotate tires according to manufacturer's recommendations.
- Balance wheel and tire assembly (static and dynamic).
- Dismount, inspect, and remount tire on wheel.
- Repair tire using internal patch.
- Reinstall wheel; torque lug nuts.

Brakes

- Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.
- Select, handle, store, and fill brake fluids to proper level.
- Bleed (manual, pressure, vacuum, or surge) brake system.
- Flush hydraulic system.
- Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action.
- Refinish brake drum.
- Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- Remove, inspect, and install wheel cylinders.
- Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
- Install wheel, torque lug nuts, and make final checks and adjustments.
- Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.

- Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.
- Remove, clean, and inspect pads and retaining hardware; determine necessary action.
- Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.
- Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
- Remove and reinstall rotor.
- Refinish rotor on vehicle.
- Refinish rotor off vehicle.
- Install wheel, torque lug nuts, and make final checks and adjustments.
- Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
- Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.
- Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
- Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, or replace as needed.
- Check parking brake operation; determine necessary action.
- Check operation of parking brake indicator light system.
- Check operation of brake stop light system; determine necessary action.
- Replace wheel bearing and race.
- Identify and inspect antilock brake system (ABS) components; determine necessary action.
- Identify traction control/vehicle stability control system components.

Electrical/Electronic Systems

- Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).
- Use wiring diagrams during diagnosis of electrical circuit problems.
- Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.
- Check electrical circuits with a test light; determine necessary action.
- Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.
- Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
- Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.
- Check electrical circuits using fused jumper wires; determine necessary action.
- Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
- Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
- Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
- Inspect and test switches, connectors, relays, solid state devices, and wires of electrical/electronic circuits; perform necessary action.
- Repair connectors and terminal ends.
- Repair wiring harness (including CAN/BUS systems).
- Perform solder repair of electrical wiring.
- Perform battery state-of-charge test; determine necessary action.

- Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.
- Maintain or restore electronic memory functions.
- Inspect, clean, fill, and replace battery.
- Perform slow/fast battery charge.
- Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- Start a vehicle using jumper cables and a battery or auxiliary power supply.
- Perform starter current draw tests; determine necessary action.
- Perform starter circuit voltage drop tests; determine necessary action.
- Inspect and test starter relays and solenoids; determine necessary action.
- Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.
- Perform charging system output test; determine necessary action.
- Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.
- Inspect, replace, and aim headlights and bulbs.

Heating and Air Conditioning

- Identify and visually inspect A/C system components.
- Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a).
- Conduct preliminary performance test of A/C system (i.e., verify compressor engagement, measure outlet duct temperature, sense temperature change across A/C components); determine necessary action.

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Engine Performance

- Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
- Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- Perform cylinder power balance test; determine necessary action.
- Perform cylinder cranking compression test; determine necessary action.
- Perform cylinder leakage test; determine necessary action.
- Verify engine operating temperature; determine necessary action.
- Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; determine necessary action.
- Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
- Retrieve and record stored OBD I diagnostic trouble codes; clear codes.
- Retrieve and record stored OBD II diagnostic trouble codes; clear codes when applicable.
- Obtain and interpret scan tool data.
- Replace fuel filters.
- Remove and replace thermostat and gasket.
- Perform common fastener and thread repair to include, remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.

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APPLIED ACADEMICS AND WORKPLACE SKILLS

The following Applied Academic Skills general statements were developed in cooperation with the Vocational-Technical Education Consortium of States (V-TECS). The process involved using the NATEF task list and the Basic/Essential Skills Taxonomy developed at Arizona State University by Dr. Lester Snyder.

Committee meetings were held in the following four cities: Atlanta, Georgia; Boston, Massachusetts; Cincinnati, Ohio; and Phoenix, Arizona. At each of the meetings, ASE Certified Master Automobile technicians were used as experts in the automotive service industry. V-TECS used experts in three academic areas (language arts, mathematics, and science) to help the committees understand the specific definitions of the concepts used in the taxonomy.

The committees were asked to identify the academic skills required to perform each task listed in the eight automobile areas. Their responses were recorded using the Basic/Essential Skills Taxonomy codes and were put into a database. After all the meetings were completed, a composite or unduplicated list of the codes was generated for language arts, mathematics, and science. Specific statements related to the use of the academic skill in the automotive industry were then written. A matrix was built to show the relationship between the composite list and each of the eight automobile areas. The general statements included in this manual were developed from the specific statements. Several crosschecks and reviews were conducted to ensure the accuracy of the statement and the relationship to the NATEF task list.

The Workplace Skills List was generated by having the committees identify the workplace skills from the V-TECS/ILLINOIS WORKPLACE SKILLS LIST that are important for employment as an automobile technician.

** Please download the Applied Academics and Workplace Skills for Automobile Technicians book from the NATEF website or contact the office to order a copy. This book includes the unduplicated list of applied academic skills in all eight automobile areas, complete with statements of their use by automobile technicians; the matrix; the definitions of the Basic/Essential Skills codes; the general narrative statements; the Workplace Skills List; and the NATEF Task List.

The information in the book will provide a common vocabulary for instructors and administrators to use in achieving academic and vocational skill standards. This information can be used by programs to document the academic skills taught in automotive technical classes. The examples for teaching an academic concept in an applied context will also be useful for schools when planning, designing, or writing curricula. **

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**NARRATIVE FOR LANGUAGE ARTS RELATED ACADEMIC SKILLS
for all**

NATEF Automobile Technician Task Lists

The automobile technician must be proficient in the following Language Arts and Communications related academic skills that are embedded in the occupation. Using these skills the technician must be able to:

- Request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates, and supervisors regarding problem symptoms and potential solutions to problems.
- Identify the purpose for all written and oral communication and then choose the most effective strategies for listening, reading, speaking, and writing to facilitate the communication process.
- Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair.
- Attend to verbal and nonverbal cues in discussions with customers, supervisors, and associates to verify, identify, and solve problems.
- Use study habits and techniques, i.e. previewing, scanning, skimming, taking notes, etc., when reviewing publications (shop manuals, references, databases, operator's manuals, and text resources) for problem solving, diagnosis, and repair.
- Use prior knowledge learned from solving similar problems to diagnose and repair specific problems.
- Write clear, concise, complete, and grammatically accurate sentences and paragraphs.
- Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer.
- Comprehend and apply industry definitions and specifications to diagnose and solve problems in all automotive systems and components.
- Follow all oral/written directions that relate to the task or system under study.
- Comprehend and use problem-solving techniques and decision trees that are contained in service manuals to determine cause-and-effect relationships.

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- Scan service manuals and databases to locate specific information for problem-solving purposes.
- Use the service manual to identify the manufacturer's specifications for system parameters, operation, and potential malfunctions.
- Interpret charts, tables, or graphs to determine the manufacturer's specifications for system operation to identify out-of-tolerance systems and subsystems.
- Supply clarifying information to customers, associates, parts supplier, and supervisors.

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**NARRATIVE FOR MATHEMATICS RELATED ACADEMIC SKILLS
for all**

NATEF Automobile Technician Task Lists

The automobile technician must be proficient in the following mathematics-related academic skills that are embedded in the occupation. Given these skills the technician must be able to:

- Determine the proper sequence of arithmetic operations to arrive at a solution that can be compared to other specifications when comparing system measurements to the manufacturer's specifications.
- Add two or more whole numbers, fractions, or decimals to determine component conformance of multiple measurements with the manufacturer's specifications.
- Subtract whole numbers, fractions, or decimals to arrive at a difference for comparison with the manufacturer's specifications.
- Divide decimals to determine measurement conformance with the manufacturer's specifications.
- Convert variables presented orally to a mathematical form that provides for an algebraic solution.
- Estimate the results of basic arithmetic operations, and accurately round up or down depending on the appropriate rule for the situation.
- Analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.
- Determine the irrelevant and/or missing data needed to solve a problem.
- Determine and interpret place value (tenths, hundredths, thousandths) when conducting precision measurements.
- Use Centigrade or Fahrenheit measurement scales to determine the existing temperature of substances such as a coolant or lubricant.
- Use English and metric volume measurement techniques to determine the volume of a system, component, or cylinder.
- Use conventional symbols (E for voltage, etc.) to solve circuit parameter calculations using formulas such as Ohm's Law, $E=IR$.

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- Understand that if the described problem has certain conditions (symptoms), then a limited number of solutions to the problem apply.
- Understand the relationship between the frequency of the occurrence of a problem (symptom) and the probability of accurately predicting the problem.
- Calculate the average (mean) of several measurements to determine the variance from the manufacturer's specifications.
- Use English and metric angle and distance measurements and techniques to determine angle variances from the manufacturer's specifications.
- Solve problems that involve determining the relative proportion of desired versus undesired ingredients or elements of a mixture, and determine if that proportion is within the manufacturer's specifications.
- Comprehend and use standards defined by each manufacturer for the system being analyzed.
- Convert test readings that are in decimal or fraction form to a ratio or percent for comparison with the manufacturer's specifications for the sub-system.
- Know when to use an estimated performance value versus an exact value, basing the decision on the system being analyzed or repaired.
- Visually perceive the geometric relationship of systems and sub-systems that require alignment.
- Construct or interpret a chart, table, graph, or symbol that depicts a range of performance characteristics that can be used for comparing various system operational conditions.
- Use measurement devices to determine the parallelism or perpendicularity of chassis, suspension, and other vehicle systems requiring geometric alignment.
- Use formulas to indirectly confirm systems that are outside of the manufacturer's specifications.
- Verify that the relationship between parallel lines and angles concurs with the manufacturer's specifications when diagnosing a system's malfunction.
- Visually formulate a belt (e.g., suspension/drive) angle and verify conformance to the manufacturer's specified angle.

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- Measure timed or sequenced operating parameters to determine conformance with the manufacturer's specifications.
- Use English and metric scales to determine the conformance of components to the manufacturer's specified weight.
- Determine the degree of conformance to the manufacturer's specifications for length, volume, and other appropriate measurements in the English and/or metric system.
- Distinguish the congruence of the measured tolerances with those specified by the manufacturer.
- Measure and/or test with tools designed for English or metric measurements, then convert the result to the manufacturer's system used for specifying the correct measurement or tolerance.
- Compute mentally whether the observed measurement is out of tolerance when comparing the observed measurement to the manufacturer's specifications.
- Solve problems that involve determining whether the proportion of the existing volume compares to the manufacturer's specifications and is within the recommended tolerance.
- Distinguish whether a measurement or tolerance is equal or not equal to the manufacturer's specifications.

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**NARRATIVE FOR SCIENCE RELATED ACADEMIC SKILLS
for all**

NATEF Automobile Technician Task Lists

The automobile technician must be proficient in the following science-related academic skills that are imbedded in the occupation. Using these skills the technician must be able to:

- Analyze and evaluate waste products from the repair task and dispose of the parts, residue, or trash according to applicable federal, state, and local rules and regulations.
- Follow all safety regulations and procedures while performing any task.
- Use the information provided in service manuals, charts, tables, or graphs to determine the manufacturer's specifications for system(s) operation(s) and the appropriate repair/replacement procedure.
- Develop a hypothesis regarding the cause of the problem and test the hypothesis to determine the solution to the problem.
 1. identify the problem
 2. gather information
 3. develop hypothesis
 4. take action
 5. check results
- Convert measurements taken using the English or metric system to specifications stated in terms of either system.
- Explain and demonstrate an understanding of the chemical reaction that occurs in an automobile regarding the combustion of fuels, catalytic converters, and contamination when introduced into systems.
- Explain the purpose of additives in lubricants.
- Demonstrate an understanding of the kinetic and potential energy relationships that occur in valve systems, ignition systems, and other stored energy systems, such as springs and fuels, and determine efficiency.
- Demonstrate an understanding of the role of balanced and unbalanced forces on linear and rotating vehicle assemblies.
- Explain the relationship of centrifugal/centripetal force to the failure of rotating systems.
- Explain the ignition characteristics of fuels resulting from varying levels of fractional distillation.

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- Demonstrate an understanding of how fuel characteristics effect combustion in an automotive engine.
- Demonstrate an understanding of the effect of heat on automotive systems.
- Explain the concept of heat transfer in terms of conduction, convection, and radiation in automotive systems.
- Demonstrate an understanding of the expansion and contraction of system parts as a result of heat generated during use and the cooling of the system when not in operation.
- Demonstrate an understanding of the effect that adding heat will cause in a state of matter, such as solid to liquid to gas.
- Explain the role of insulation in maintaining stable temperatures.
- Demonstrate an understanding of refraction in fiber optic systems.
- Explain that dyes added to lubricants fluoresce in ultraviolet light and provide a process for determining the source of leakage.
- Demonstrate an understanding of the process of acceleration and deceleration as a function of weight and available power.
- Demonstrate an understanding of the reaction of fluid to the motion of a valve or piston.
- Demonstrate an understanding of the circular motion of a vehicle as it relates to such events as toe-out on turns and tracking.
- Demonstrate an understanding of the types of vibrations caused by out-of-balance or excessively worn systems.
- Explain to a customer how sound can be amplified due to resonant cavities and other physical characteristics of the vehicle.
- Explain and demonstrate an understanding of how sound generated in one place in the body and engine can be carried to other parts of the engine through metal and other materials.
- Explain the need for sound deadening and vibration damping materials to control the level of sound in the passenger compartment.
- Demonstrate an understanding of the relationship of the perceived intensity to the decibel level of a noise.

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- Explain the relationship of the frequency of the sound to a normal or abnormally operating system.
- Explain and demonstrate an understanding of the role of listening to sounds as part of the troubleshooting process.
- Explain that the presence of overtones may indicate changes in the vibrations of various systems.
- Demonstrate an understanding of the relationship of barometric pressure to engine performance (horsepower).
- Explain the relationship of engine torque to vehicle performance.
- Explain how levers and pulleys can be used to increase an applied force or distance.
- Identify the effect of the pH of a solution on chemical changes in a system.
- Identify the characteristics that define a system that is operating within the manufacturer's specifications.
- Use precision measuring devices to determine if wear and adjustments are within the manufacturer's specifications, and to assure that repair or replacement parts meet the manufacturer's specifications.
- Use tension gauges, such as a torque wrench, to measure the force or tension required to tighten connections to the manufacturer's specifications.
- Use a scale to measure component weight to balance rotating systems.
- Use pressure measuring tools to determine pressures in hydraulic or pneumatic systems and compare to the manufacturer's specifications.
- Use direct and indirect methods to measure system temperatures and then convert to Fahrenheit/Centigrade as required.
- Use direct and indirect methods to measure time and compare the results to the manufacturer's specifications.
- Use direct and indirect methods to measure the volume of liquids in a system and compare to the manufacturer's specifications.

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- Use computer databases for information retrieval and input devices to process information for customers, billing purposes, warranty work, and other record-keeping purposes.
- Explain how an applied force at one location can be transmitted via fluid pressure to provide a force at a remote location.
- Explain catalytic converter principles which modify emission gases at the atomic level to provide a low level of HC, CO, and NO_x in the final exhaust.
- Explain the role that friction plays in acceleration and deceleration of objects as illustrated by transmitting motion to a part not physically connected to the powered part.
- Explain to the customer the need for lubrication of adjacent parts to minimize friction as a result of movement at the junction of the parts.
- Explain the necessity of knowing that the hardness of a metal determines, in part, its function and location in the automobile.
- Explain the dynamic control properties of a hydraulic system.
- Explain the surface processes that occur on system seals due to the absorption of the contained materials.
- Demonstrate an understanding of how the deterioration in an engine's performance can be caused by a chemical reaction that occurs in a liquid that has been contaminated.
- Demonstrate an understanding of how torque relates to force and angular acceleration.
- Demonstrate an understanding of how cams, pulleys, and levers are used to multiply force or transfer directions of force.
- Explain how rotational motion is changed to linear motion and the need for balance in rotating systems.
- Demonstrate an understanding of how variances in flow rate in airflow sensors or cooling systems can effect engine performance.

Electrical/Tolerances

- Explain and demonstrate an understanding of the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.

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- Demonstrate an understanding of the characteristics of a quality electrical ground and explain the problems associated with an inadequate electrical circuit ground.
- Explain voltage and current flow in series and parallel circuits.
- Demonstrate an understanding of the processes used to locate a short circuit in the electrical/electronic system.
- Demonstrate an understanding of the role of the alternator in maintaining battery and system voltage.
- Demonstrate an understanding of the role of solar panels in maintaining battery voltage and operating selected accessories.
- Explain and demonstrate an understanding of the ignition coil's role in generating the high voltages required to fire the sparkplug.
- Demonstrate an understanding of the correct procedure used to measure the electrical parameters of voltage, current, resistance, or power.
- Explain and demonstrate an understanding of the role of a fuse or fusible link as a protective device in an electrical or electronic circuit.
- Explain and demonstrate an understanding of the use of Ohm's Law in verifying circuit parameters (resistance, voltage, amperage).
- Explain and demonstrate an understanding of the relationship of resistance to heat, voltage drop, and circuit parameters.
- Explain and demonstrate an understanding of system voltage generation, uses, and characteristics.
- Demonstrate an understanding of the ion transfer process that occurs in an automotive battery.
- Explain the conductivity problems in a circuit when connectors corrode due to electrochemical reactions.
- Explain the relationship between electrical current in a conductor and the magnetic field produced in a coil such as the starter solenoid.
- Explain the ability of a coil to increase battery voltage to the level required to fire a spark plug.

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- Explain the effect of magnetic fields on unshielded circuits in selected control modules.
- Explain the need for a specific gravity test of battery electrolyte to determine charge.
- Use precision electrical test equipment to measure current, voltage, resistance, continuity, and/or power.
- Demonstrate an understanding of the role of capacitance in timer circuits, such as RC timers or MAP sensors, where the changing manifold pressure causes two metal discs to act like a capacitor by sending varying voltage to the electronic engine control system.
- Demonstrate an understanding of the capacity of semiconductor devices to modify rapidly engine operation parameters depending on multiple inputs from engine operational sensors.
- Explain how the movement of a conductor in a magnetic field can generate electricity.
- Demonstrate an understanding of the role of mechanical transducers in sending electrical control signals to modify system operating characteristics.
- Demonstrate an understanding of the purpose of photocells and measurement processes relative to determining output.

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WORKPLACE SKILLS

IDENTIFIED AS BEING IMPORTANT BY THE NATEF AUTOMOTIVE TECHNICIANS RELATED ACADEMIC SKILLS COMMITTEE FROM THE V-TECS/ILLINOIS WORKPLACE SKILLS LIST.

A. DEVELOPING AN EMPLOYMENT PLAN

1. Match interests to employment area.
2. Match aptitudes to employment area.
3. Identify short-term work goals.
4. Match attitudes to a job area.
5. Match physical capabilities to a job area.
6. Demonstrate a drug-free status.

B. SEEKING AND APPLYING FOR EMPLOYMENT OPPORTUNITIES

1. Identify steps in applying for a job.
2. Locate employment opportunities.
3. Identify job requirements.
4. Identify conditions for employment.
5. Evaluate job opportunities.
6. Prepare a resume.
7. Write job application letter.
8. Complete job application form.
9. Prepare for job interview.
10. Dress for job interview.

C. ACCEPTING EMPLOYMENT

1. Apply for social security number.
2. Complete state and federal tax forms.
3. Complete employees withholding allowance certificate form W-4.

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D. COMMUNICATING ON THE JOB

1. Communicate orally with others.
2. Ask questions about task.
3. Follow written and oral directions.
4. Prepare written communication.
5. Interpret the use of body language.
6. Use telephone etiquette.

E. INTERPRETING THE ECONOMICS OF WORK

1. Describe responsibilities of an employee.
2. Describe responsibilities of employer or management.
3. Investigate opportunities and options for business ownership.

F. MAINTAINING PROFESSIONALISM

1. Participate in employment orientation.
2. Treat people with respect.
3. Exhibit positive behavior.
4. Comply with organizational expectations.
5. Comply with company dress and appearance standards.
6. Use job-related terminology.
7. Participate in meetings in a positive and constructive manner.
8. Assess business image and products/services.

G. ADAPTING/COPING WITH CHANGE

1. Identify the elements of the job transition.
2. Exhibit ability to handle stress.
3. Recognize need to change or quit a job.
4. Write a letter of resignation.

H. SOLVING PROBLEMS AND CRITICAL THINKING

1. Clarify purposes and goals.
2. Identify the problem.
3. Employ reasoning skills.
4. Assess employer and employee responsibility in solving a problem.
5. Evaluate options.

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6. Estimate results of implemented options.
 7. Set priorities.
 8. Identify solutions to the problem and their impact.
 9. Select and implement a solution to a problem.
 10. Prioritize and organize workloads.
- I. MAINTAINING A SAFE AND HEALTHY ENVIRONMENT**
1. Follow conservation/environmental practices and policies.
 2. Comply with safety and health rules/procedures.
 3. Identify hazardous substances in the work place.
 4. Use and maintain proper tools and equipment.
 5. Maintain work area.
 6. Act during emergencies.
- J. DEMONSTRATING WORK ETHICS AND BEHAVIOR**
1. Follow rules, regulations and policies as established.
 2. Implement responsibilities of job position.
 3. Maintain regular attendance.
 4. Assume responsibility for decisions and actions.
 5. Demonstrate willingness to learn.
 6. Practice time management.
 7. Practice cost effectiveness.
 8. Apply ethical reasoning.
 9. Display initiative.
 10. Display assertiveness.
 11. Exhibit pride.
- K. DEMONSTRATING TECHNOLOGY LITERACY**
1. Demonstrate basic keyboarding skills.
 2. Demonstrate basic knowledge of computing.
 3. Recognize impact of technological changes on tasks and people.
- L. MAINTAINING INTERPERSONAL RELATIONSHIPS**
1. Value individual diversity.
 2. Respond to praise or criticism.
 3. Provide constructive praise or criticism.

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4. Channel and control emotional reactions.
5. Resolve conflicts.
6. Display a positive attitude.
7. Identify and react to sexual intimidation/harassment.

M. DEMONSTRATING TEAMWORK

1. Identify style of leadership used in teamwork.
2. Match team member's skills and group activity.
3. Work with team members.
4. Complete a team task.
5. Evaluate outcomes.

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TOOLS AND EQUIPMENT – GENERAL SERVICE TECHNICIAN PROGRAM

The NATEF tool lists are organized into three basic categories: *Hand Tools*, *General Lab/Shop Equipment*, and *Specialty Tools and Equipment*. The specialty tools section is further separated into NATEF task categories. When referring to the tools and equipment list, please note the following:

1. The organization of the tool list is not intended to dictate how a program organizes its tool crib or student tool sets (i.e., which tools should be in a student set, if utilized, and which should be in the tool crib or shop area).
2. Quantities for each tool or piece of equipment are determined by the program needs; however, sufficient quantities to provide quality instruction should be on hand.
3. Programs may meet the equipment requirements by borrowing special equipment or providing for off-site instruction (e.g., in a dealership or independent repair shop). Use of borrowed or off-site equipment *must* be appropriately documented.
4. No specific brand names for tools and equipment are specified or required.
5. Although the NATEF Standards recommend that programs encourage their students to begin to build their own individual tools sets prior to entry into the industry, there is no requirement to do so. NOTE: Industry surveys indicate that most (90%) employers require that a candidate for employment provide his/her own basic hand tool set in order to be hired as an entry-level automobile technician.

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HAND TOOLS

(Contained in individual sets or the tool crib in sufficient quantities to permit efficient instruction.)

Air Blow Gun (meeting OSHA requirements)

Allen (Wrench or Socket) Set - Standard (.050" - 3/8")

Allen (Wrench or Socket) Set - Metric (2mm - 8mm, 10mm, 12mm)

Battery Post Cleaner

Battery Terminal Pliers

Battery Terminal Puller

Chisels:

Cape 5/16"

Cold 3/8", 3/4"

Chisel Holder

Claw Type Pickup Tool

Combination Wrenches:

Standard (1/4" - 1 1/4")

Metric (7mm - 24mm)

Crowfoot Wrench Set - Metric

Crowfoot Wrench Set - Standard

Ear Protection

Feeler Gauge (Blade Type):

.002" - .040"

.006mm - .070mm

Files:

Coarse 6" and 12"

Fine 6" and 12"

Half Round 12"

Round 6" and 12"

Flare Nut (tubing) Wrenches:

3/8" - 3/4"

10mm - 17mm

Flashlight

Fuse Puller

Fused Jumper Wire Set (with various adapters)

Hack Saw

Hammers:

16 oz. Ball Peen

Brass

Dead Blow Plastic Mallet

Plastic Tip

Rubber Mallet

Inspection Mirror

Magnetic Pickup Tool

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Pliers:
Combination 6"
Hose Clamp
Locking Jaw
Needle Nose 6"
Side Cutting
Slip Joint (Water Pump)
Pry Bars:
Rolling Head
Straight
Punches:
Center
Brass Drift
Pin 1/8", 3/16", 1/4", 5/16 "
Taper 3/8", 1/2", 5/8"
Safety Glasses (meeting OSHA requirements)
Scraper:
Carbon 1"
Gasket 1"
Screwdriver - Blade Type:
Stubby
6", 9", 12"
Offset
Screwdriver - Phillips:
Stubby #1, #2
6" #1, #2
12" #3
Offset #2
Screwdriver - Impact Driver Set
Screw Starter:
Phillips
Standard
Socket Set - 1/4" Drive:
1/4" - 1/2" Standard Depth
1/4" - 1/2" Deep
6mm - 12mm Standard Depth
6mm - 12mm Deep
Flex/Universal Type
3", 6" Extensions
Ratchet
Socket Set - 3/8" Drive:
5/16" - 3/4" Standard Depth (6 point)
3/8" - 3/4" Deep (6 point)
10mm - 19mm Standard Depth
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10mm - 19mm Deep
3", 5", 10" Extensions
Flexhead Ratchet
Ratchet
Spark Plug Sockets 5/8", 13/16"
Speed Handle
Universal Joint
Flexible Socket Set 3/8" - 3/4"
Flexible Socket Set 10mm - 19mm
Socket Set - 1/2" Drive:
7/16" - 1 1/8" Standard Depth
7/16" - 1 1/8" Deep
10mm - 24mm Standard Depth
10mm - 24mm Deep
3", 6", 12" Extensions
Flex Handle (Breaker Bar)
Ratchet
Spark Plug Feeler Gauge (Gap Tool)
Tape Measure – Standard and Metric
Test Light (12V)
Tire Pressure Gauge
Torque Wrench:
3/8" Drive (10 - 250 lb. in.)
3/8" Drive (5 - 75 lb. ft.)
1/2" Drive (50 - 250 lb. ft.)
Torx® Set (screwdrivers and/or sockets):
T-8 to T-60
Wire Brush
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GENERAL LAB/SHOP EQUIPMENT

The tools and equipment on this list are used in general lab/shop work but are not generally considered to be individually owned hand tools. A well equipped, certified program should have all of these general tools and equipment readily available and in sufficient quantity to provide quality instruction.

Air Chisel Set (various bits)
Air Compressor and Hoses
Air Pressure Regulator
Air Ratchet (3/8" drive)
Automotive Stethoscope (electronic recommended)
Axle Stands (Jack Stands)
Axle Support Stands (Screw Jacks)
Battery Charger
Battery/Starter/Charging System Tester
Bearing Packer (hand operated)
Belt Tension Gauge
Bench or Pedestal Grinder
Compression Tester
Coolant/Combustion Gas Detector (Recommended)
Coolant Tester
Cooling System Pressure Tester and Adapters
Crepper
Cylinder Leakage Tester
Dial Indicator with Flex Arm and Clamp Base
Digital Multimeter with various lead sets
Drain Pans
Drill - 3/8" variable speed, reversible
Drill - 1/2" variable speed, reversible
Electric Heat Gun
Engine Coolant Recovery Equipment or Recycler or Coolant Disposal Contract Service
Extension Cords
Face Shields
Fender Covers
Floor Jack (1½ Ton Minimum)
Graphing Multimeter (GMM)/Digital Storage Oscilloscope (DSO)
Hand Held Vacuum Pump
Hoist(s)
Hood Prop
Hydraulic Press with adapters
Impact Socket Sets - 3/8" Drive (Standard and Metric)
Impact Sockets - 1/2" Drive (7/16" - 1 1/8")
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Impact Sockets - 1/2" Drive (12mm – 24mm)
Impact Sockets – 1/2" Drive Deep (30 mm, 32 mm, 36mm)
Impact Wrench - 1/2" Drive
Impact Wrench - 3/8" Drive
Jumper Cables
Master Puller Set
Micrometer (Depth)
Micrometers - 0-1", 1-2", 2-3", 3-4", 4-5" (Outside Type)
Oil Can - Pump Type
Oil Filter Wrench
Oxy-Acetylene Torch set (recommended)
Parts Cleaning Tank and Gloves (non-solvent based cleanser suggested)
Remote Starter Switch
Scan Tool (OBDII) or Personal Computer (PC) with equivalent interface capability (CAN capability recommended)
Screw Extractor Set
Seat Covers
Snap Ring Pliers Set - external
Snap Ring Pliers Set - internal
Soldering Gun
Soldering Iron (Pencil Tip)
Spark Plug Boot Puller
Tap and Die Set - Standard
Tap and Die Set – Metric
Temperature Sensing Device
Thread Repair Insert Kit
Tire Inflator Chuck
Trouble/Work Lights (Fluorescent Preferred)
Tube Quick Disconnect Tool Set
Tubing Bender
Tubing Cutter/Flaring Set (Double-lap and ISO)
Twist Drill Set - 1/64" - 1/2"
Ultra Violet Leak Detection Device (Black Light)
Used Oil Receptacle with extension neck and funnel
Valve Core Removing Tool
Vernier Calipers
0 - 6"
0 - 125mm
Wheel Chocks
Workbenches with vises
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SPECIALTY TOOLS AND EQUIPMENT

This section covers the tools and equipment a lab/shop should have for training in any given specialty area. This equipment is specialized and it must be available in the lab/shop or to the program. No specific type or brand names are identified because they will vary in each local situation.

SUSPENSION & STEERING

Hand Grease Gun
Shock Absorber Tools
Strut Spring Compressor Tool
Tire Mounting Machine (rim clamp type)
Wheel Balancer - Electronic Type
Wheel Weight Pliers

BRAKES

Bearing Seal and Race Driver Set
Brake Bleeder, Pressure or Vacuum
Brake Disc Micrometer
Brake Drum Micrometer and Calibration Equipment
Brake Lathe (bench with disc and drum service attachments)
Brake Lathe (on car)
Brake Shoe Adjusting Gauge
Brake Spring Remover/Installer
Brake Spring Pliers
Brake Spoon
Piston Retraction Set

ENGINE PERFORMANCE

Engine Analyzer (with ignition display capability)
Four or Five Gas Exhaust Analyzer (five gas recommended)
Pinch-off Pliers
Spark Plug Thread Tap
Spark Tester
Vacuum/Pressure Gauge

ELECTRICAL/ELECTRONIC SYSTEMS

Battery Hydrometer
Connector Pick Tool Set
Headlight Aimer or Screen

Wire and Terminal Repair Kit

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