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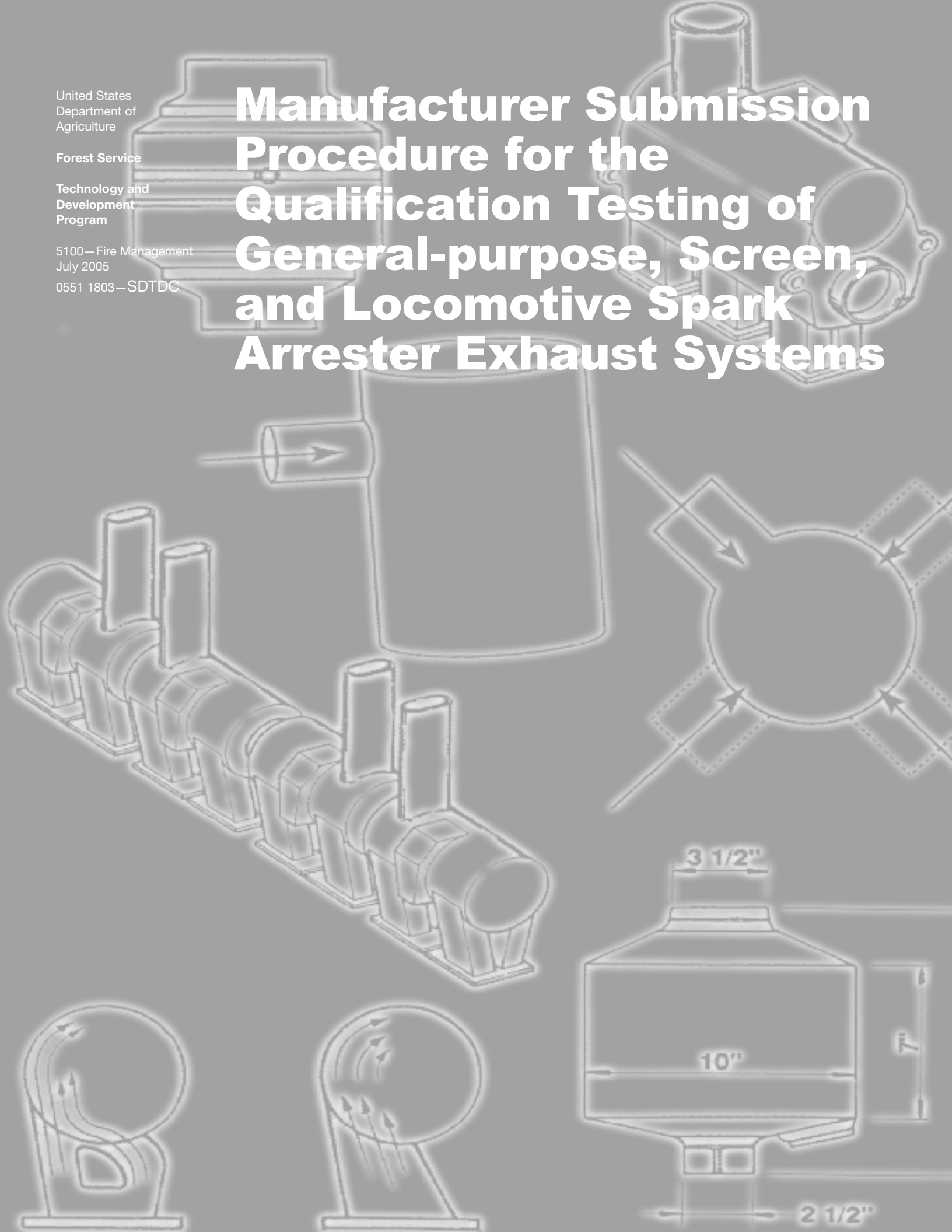
Forest Service

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Manufacturer Submission Procedure for the Qualification Testing of General-purpose, Screen, and Locomotive Spark Arrester Exhaust Systems



Manufacturer Submission Procedure for the Qualification Testing of General- purpose, Screen, and Locomotive Spark Arrester Exhaust Systems

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USDA Forest Service

San Dimas Technology and
Development Center
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I. INTRODUCTION

This submission procedure is specifically for use by a manufacturer in submitting a general-purpose or locomotive spark arrester exhaust system for evaluation and qualification testing. General-purpose spark arresters include screen-type, trap-type, and pulverizing-type spark arresters. Screen-type spark arresters have additional requirements and will be addressed separately in this text.

The spark arrester qualification test provides a method of testing to evaluate the spark arresting effectiveness of the general-purpose and locomotive exhaust systems. This type of equipment may come into close proximity with grass, brush, timber, and similar cellulose materials with potential for fire ignition.

The present evaluation program is based on performance requirements established by the USDA Forest Service Standard 5100-01c, "Spark Arresters for Internal Combustion Engines" for General-purpose/Screen Spark Arrester Performance Requirements and the Society of Automotive Engineers (SAE) Recommended Practice J350, "Spark Arrester Test Procedure for Medium Size Engines."

Locomotive spark arresters performance requirements are defined in SAE Recommended Practice J342, "Spark Arrester Test Procedure for Large Size Engines," the Association of American Railroads (AARR) Recommended Practice "Standard For Spark Arresters for Non-Turbocharged Diesel Engines in Railroad Locomotives" and the USDA Forest Service Standard 5100-01c.

Qualification for general-purpose and locomotive spark arresters require that the exhaust system shall have a minimum of 80 percent spark arresting effectiveness in the laboratory test. Screen-type spark arresters have the following requirements:

- a. Spark arrester exhaust screens may not contain openings greater than 0.023 inch.
- b. Effective open area of the screen shall be greater than 200 percent of the smallest restriction before the spark arrester.
- c. Screen material must be heat and corrosion resistant.
- d. Screen shall provide a minimum of 100 hours of service life.

II. REQUEST FOR QUALIFICATION TESTING

A manufacturer making a request for qualification testing to the USDA Forest Service at the San Dimas Technology and Development Center (SDTDC) in San Dimas, California, needs to fill out a form. Forms for submitting a spark arrester exhaust system for qualification testing are contained in the appendixes of the document and may be copied for submission purposes. Electronic versions of these forms are also available upon request. Only SDTDC forms will be accepted.

III. TYPES OF TEST AND TEST FEES

A. Full Qualification Test\$ 1,710.00

The full qualification test is the standard qualification test and is conducted according to USDA Forest Service Standard 5100-01c and SAE Recommended Practice J350.

B. Screen-type Spark Arrester \$1,450.00

The screen qualification test is the standard qualification test for the screen-type general-purpose spark arresters and is conducted in accordance with USDA Forest Service Standard 5100-01c.

C. Waiver Evaluation \$ 400.00

Most general-purpose/screen spark arrester manufacturers develop several lines of spark arresters to meet widely differing applications. With each line there may be several models, which differ only slightly from each other and employ the same exhaust system. These differences may have little or no effect on the spark arresting effectiveness. Where such a condition exists, it may only be necessary for full qualification testing on the initial "parent" spark arrester and allow waiver evaluation to qualify "child" spark arresters. The unit selected as the "parent" spark arrester should be the one representing the most severe application for the group of applications being considered. Qualification by waiver is determined by the USDA Forest Service at the SDTDC.

D. Qualification By Examination..... \$1,300.00

When a manufacturer has made certain limited modifications to a general-purpose spark arrester, or if a new model has an arresting section identical to an already qualified model, an examination of appropriate

drawings and a spot check of efficiency may be necessary, as determined by the SDTDC, to qualify this unit without the full standard qualification test. A decision as to qualification status of any modification is made by SDTDC. General-purpose spark arresters may be submitted for qualification by examination if the modifications are limited to moderate changes in the inlet size, moderate changes in the outlet size if it is downstream of the carbon separation point, and minor changes in the carbon-trap capacity provided this capacity remains adequate. Any additional internal changes to the spark arresting section must be evaluated with a full qualification test.

E. General-purpose Quick Test..... \$1,300.00

The general-purpose quick test provides a limited test of arrester performance to give the manufacturer an indication of the effectiveness of his product prototype at a limited number of points along the presumed operating flow range. An arrester cannot be qualified under this test. This test is provided as a service to the manufacturer in the product development phase to assist the manufacturer in determining if the unit should be considered for submission for the full qualification test.

V. SUBMISSION DATA PACKAGE REQUIREMENTS

A. General-purpose and Screen-type Spark Arresters.

The submission data package consists of required forms, test fees, and hardware necessary to complete the evaluation. A unit will not be scheduled for evaluation until all forms and hardware are received. The following are required forms, documentation, drawings, fees, and hardware:

1. Collection Agreement—SDTDC 7100-12 (02/01)
The collection agreement is a form used by a manufacturer to enter into an agreement with SDTDC to perform qualification testing. A separate collection agreement must be sent for each sample test unit and for each position the general-purpose sample test unit is to be tested. See the section herein entitled “Spark Arrester Position of Application.” An original signature must appear on the collection agreement. A signed copy of the collection agreement will be returned to the manufacturer along with

an estimated completion date. The collection agreement will be effective on the latest date that appears on the collection agreement and is valid up to 1 year from that date. See appendix 1A.

2. General-purpose and Screen Spark Arrester Test Data Sheet, SDTDC 7100-35 (02/01)—The data sheet contains information required to complete the qualification evaluation. This form is also a checklist to assure that the data package is complete. The checklist must be signed by the manufacturer’s representative to assure that the data package is complete. See appendix 1D.
3. A test fee in the form of a check made out to the USDA Forest Service. This test fee will cover direct and indirect costs of conducting the test. If costs exceed the initial estimate, additional funds will be requested. The collection agreement fee is placed in the manufacturer’s pool account.
4. Spark arrester installation, cleanout, and maintenance instructions as would be provided with the unit to the consumer. The cleanout shall be accomplished readily by the consumer without the removal of the clamping or mounting devices from the stack, pipe, or manifold assembly. Screen-type spark arresters shall provide for the easy removal, cleaning, and replacement of the screen.
5. A quality line drawing to be used in the Spark Arrester Guide (SAG). The drawing will provide an illustration for field inspectors to identify the unit. See the attached examples in appendix 3A.
6. A complete set of engineering working drawings with internal and external construction details with dimensions.
7. Sample test unit. Qualification testing will be performed on preproduction or full production models only. Testing of a prototype must be followed by a test of the production model before the unit can be listed as a qualified unit. Changes or modifications to a design are not permitted during a qualification test. Production models must be permanently marked with manufacturer identification in the form of a trademark or name and unique spark arrester alphanumeric

model identification. The model identification must match exactly the number called out in the collection agreement. In addition, the screen-type spark arresters must have “Screen-type” clearly imprinted in 1/8-inch or larger letters on the arrester or on a readily visible exterior surface near the exhaust outlet. A temperature-resistant decal can be an option to imprinting “Screen-type.” If a general-purpose spark arrester can be disassembled, as in a spark arrester insert in a muffler shell or a unit with an end cap, reassembly must be indexed to one position only. The exhaust system identification shall be visible without removal of the exhaust system from the engine.

8. For screen-type spark arresters with a 50 horsepower (hp) or greater engine application, 100-hour endurance test data shall be submitted for the screen-type spark arrester qualification test and the screen-type qualification by exam test. The 100-hour endurance test shall be performed in accordance with the requirements of FSS 5100-01c. See the section herein entitled “Endurance Test for the Screen-type Spark Arrester.”
9. Any special tools that may be required to complete testing.
10. A spark arrester chamber mounting adapter must be included, if necessary, for qualification testing. Failure to submit adapters will result in the delay of the testing and additional expenses may be incurred.

B. Locomotive Spark Arresters

The following are required when submitting a request for locomotive qualification testing:

1. **Collection Agreement—SDTDC 7100-14 (02/01)**
The collection agreement is a form used by a manufacturer to enter into an agreement with SDTDC to perform qualification testing. A separate collection agreement must be sent for each sample test. An original signature must appear on the collection agreement. A signed copy of the collection agreement will be returned to the manufacturer along with an estimated

completion date. The collection agreement will be effective on the latest date that appears on the collection agreement and is valid up to 1 year from that date. See appendix 1B.

2. Spark arrester installation, cleanout, and maintenance instructions as would be provided with the unit to the consumer. The cleanout shall be accomplished readily by the consumer without the removal of the clamping or mounting devices from the stack, pipe, or manifold assembly. The arrester, if of the retention type, shall have provisions for the easy disposal of accumulated carbon particles.
3. A quality line drawing to be used in the Spark Arrester Guide (SAG) is required. See attached examples in appendix 3B.
4. A complete set of engineering working drawings with internal and external construction details and dimensions.
5. Include hardware to be tested. Qualification testing will be performed on preproduction or full production models only. Testing of a prototype must be followed by a test of the production model before the unit can be listed as a qualified unit. Changes or modifications to a design are not permitted during a qualification test. The external locomotive spark arrester is usually mounted on the exhaust stack with the requirement that the body of the spark arrester be permanently marked with the manufacturer identification and unique spark arrester alphanumeric model identification by stamping the metal surface or by attaching a metal plate.

For the manifold-type internal spark arrester, the above identification must be stamped in the metal body or on an attached plate affixed to the manifold. The model identification must match exactly the number called out in the collection agreement.

6. Qualification testing will be arranged with the manufacturer at a mutually agreeable time and location. The manufacturer will be responsible for expenses associated with testing.

C. Waiver Evaluation

The following are required when submitting a request for qualification waiver evaluation:

1. Collection Agreement—SDTDC 7100-13 (02/01)
The collection agreement is a form used by a manufacturer to enter into an agreement with SDTDC to perform qualification testing. A separate collection agreement must be sent for each sample test. An original signature must appear on the collection agreement. A signed copy of the collection agreement will be returned to the manufacturer along with an estimated completion date. The collection agreement will be effective on the latest date that appears on the collection agreement and is valid up to 1 year from that date. See appendix 1C.
2. Waiver Request Information Data Sheet SDTDC 7100-34 (02/01)—Information required to perform the waiver evaluation is included in this data sheet. A checklist of required documents is included in this data sheet and must be signed by a representative of the manufacturer to assure completeness. See appendix 1E.
3. A test fee in the form of a check made out to the USDA Forest Service. This test fee will cover direct and indirect costs of conducting the test. If costs exceed the initial estimate, additional funds will be requested. The collection agreement fee is placed in the manufacturer's pool account.
4. The 100-hour endurance test data as performed in accordance with the requirements of FSS 5100-01c will be submitted for the screen-type spark arrester for an engine application of 50 hp or greater.
5. A complete set of engineering drawings indicating internal and external construction details with dimensions of the previously qualified exhaust system.
6. A quality line drawing to be used in the Spark Arrester Guide (SAG) is required. See attached examples in appendix 3A.

7. Detailed engineering working drawings of the waiver unit and the previously qualified unit. This is only required if modifications can be depicted by engineering drawings.

D. Endurance Test for the Screen-type Spark Arrester

1. A test data package of a 100-hour endurance test as performed in accordance with the FSS 5100-01c shall be submitted for the screen-type spark arrester qualification test for screen-type spark arresters used on engines with a 50 hp or greater engine application. The general-purpose and screen spark arrester test data sheet contains a section for the endurance test and must be completed by the manufacturer.
2. The hardware to be submitted consists of the screen-type spark arrester with the new screen installed, and any parts that may have failed during the 100-hour endurance test. It is important that the screen and exhaust assembly not be cleaned or altered in any way the last 25 hours of the endurance test and also following the completion of the endurance test.

VI. DATA PACKAGE DEFICIENCIES

When the manufacturer's submittal has been determined to be incomplete, the qualification evaluation will be placed on hold and the manufacturer contacted. The collection agreement will be kept open for 4 weeks awaiting documentation addressing the deficiencies. A time extension may be granted upon request. Once these deficiencies are addressed, the qualification evaluation will be completed. If the deficiency is not addressed within the time frame, the collection agreement will be automatically closed and all submittal documentation returned to the manufacturer.

VII. SCHEDULING OF TESTING

Testing will be scheduled after all submittal paperwork and hardware has been received and approved by the spark arrester project leader. A letter with a copy of the signed collection agreement will be returned to the manufacturer. The letter will also include an estimated completion date.

VIII. QUALIFICATION

A qualification notice will be issued to the manufacturer when it has been determined that the submitted general-purpose, screen-type, or locomotive spark arrester has met all the performance requirements. The following will be included in the qualification letter:

- a. Spark arrester model number
- b. Flow rate
- c. Position of application
- d. Remarks
- e. Summary of the test results

The general-purpose spark arrester will be qualified for a specific position of application. The general-purpose spark arresters on mobile equipment shall not be mounted more than 45 degrees from the qualified position.

The screen-type spark arrester will be qualified for a specific engine, stroke cycle, maximum governed rpm, and at the manufacturer's rated engine horsepower. Manufacturers wanting to qualify a screen-type spark arrester for a series of engines must include the engine displacement, smallest restriction before the spark arrester, and maximum horsepower @ rpm. The series of engines will be included in the remarks section of the qualification letter and the Spark Arrester Guide.

The locomotive spark arrester will be qualified for a specific body type and leg configuration. See appendix 4A for data on body types and appendix 4B for leg configurations.

IX. FAILURE TO QUALIFY

A failure to qualify notice will be issued to the manufacturer when it has been determined that the submitted general-purpose, screen-type, or locomotive spark arrester exhaust system has not met all the performance requirements. A summary of test results will be included in the failure to qualify notice. A failed spark arrester or spark arrester exhaust system cannot be resubmitted for testing under the same model designation or under the same collection agreement. A resubmission must meet all the requirements for a new submission

X. SPARK ARRESTER POSITION OF APPLICATION

Spark arrester positions are classified as vertical, horizontal, multiposition, and inverted. The orientation of the inlet as it enters the spark arrester body. This coincides with the direction of flow as it enters the spark arrester body. The following are examples:

- a. The spark arrester inlet is horizontal and the body is vertical, the position of application is horizontal.
- b. The exhaust flows vertically upward, the position of application is vertical regardless of the position of the spark arrester body.
- c. The exhaust flows vertically downward as it enters the spark arrester body. The position is classified as inverted and the inlet or outlet shall be identified.
- d. Screen-type spark arresters are classified as multiposition. See appendix 2.

XI. MODIFICATIONS TO THE SPARK ARRESTER

Any modification or damage to any part of the spark arrester or spark arrester exhaust system as it was originally submitted to SDTDC for qualification testing voids the qualification of the spark arrester. Examples of modifications include removal of or damage to the spark arrester or body parts, a change in the exhaust outlet, improper mounting, exhaust bypasses, and replacing fiberglass packing with steel wool.

XII. DISPOSAL OF HARDWARE

All hardware will be returned to the manufacturer including the spark arrester exhaust system, adapters, and any special tools sent by the manufacturer to complete testing

XIII. TEST FACILITY LIMITATION

Physical limitations of the SDTDC test facilities preclude testing a general-purpose spark arrester with an inlet size greater than 6 inches. In this situation, qualification testing will be arranged with the manufacturer. Testing outside of routine require special arrangements and may require adjustment of fees submitted and time required for testing. For further information contact

USDA Forest Service
San Dimas Technology and Development Center
Attn: Spark Arrester Project Leader
444 East Bonita Avenue
San Dimas, CA 91773
(909) 599-1267 x212
Email: rhgonzales@fs.fed.us

This **COLLECTION AGREEMENT** is hereby entered into by and between the USDA Forest Service, San Dimas Technology and Development Center, hereinafter referred to as the Forest Service, and the _____, hereinafter referred to as the Company under provisions of the Cooperative Funds Act of June 30, 1914 (16 USC 498).

A. PURPOSE:

The Company desires to have the Forest Service conduct a _____ type evaluation on its model _____ spark arrester in the _____ position of application to determine whether it meets the requirements of Forest Service Standard 5100-1c, "Spark Arresters for Internal Combustion Engines."

The Forest Service is willing to perform the qualification evaluation in order to increase the number of qualified products that meet the Forest Service Standard 5100-1c.

The Company is willing to advance funds to defray the costs to the Forest Service to perform such an evaluation of the Company's product.

It is mutually advantageous at this time to both parties to have tests and evaluations performed.

B. THE COMPANY SHALL:

1. Deliver a data package and necessary documentation to the San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773.
2. Make advance payments at such time as requested by the Forest Service by check payable to USDA Forest Service, addressed to 444 East Bonita Avenue, San Dimas, California 91773, drawn on a United States bank, for deposit. Such funds will be used to pay all direct and indirect costs of performing the test currently estimated at approximately \$_____. If costs exceed the amount of the initial estimate, work will be stopped and an additional advance requested.
3. Furnish their tax identification number upon execution of this agreement pursuant to the Debt Collection Improvement Act of 1996, as amended by Public Law 104-134. The Company also agrees that notice of the Forest Service's intent to use such number for purposes of collection and reporting on any delinquent amounts arising out of such Company's relationship with the Government, has hereby been given.

C. THE FOREST SERVICE SHALL:

1. Perform the necessary qualification evaluation.
2. Inform the Company of the estimated testing completion date, keep the Company informed as work progresses, and furnish the Company a final report within one month of completion of the qualification evaluation. This report will state whether or not the exhaust system meets Forest Service Standard 5100-1c.
3. Annually refund to the Company any amounts in excess of the cost of doing said work, or at the request of the Company, apply such excess to subsequent agreements.

D. IT IS MUTUALLY AGREED AND UNDERSTOOD BY ALL PARTIES THAT:

1. The results of the tests may be published by the Forest Service at its discretion. The Company may publish or distribute its own publication of the test results outside its organization with the consent of the Forest Service through the Manager of the San Dimas Technology and Development Center. Publication or use of reports or results by the Company through advertising or other media will not be made in any way that implies the endorsement of the Forest Service of the product tested, or which broadens or distorts the factual findings of the tests. Any publication of these results will give appropriate recognition to both parties.
2. The Forest Service shall not be liable to the depositor for any damage incident to the performance of this agreement.
3. The principal contacts for this agreement are:

USDA Forest Service
Ralph Gonzales
444 East Bonita Avenue
San Dimas, CA 91773
(909) 599-1267 x212

Company Principal Contact

4. This agreement is executed as of the last date shown below and expires in 1 year, at which time it will be subject to review, renewal, or expiration.
5. Either party may terminate this agreement by providing written notice prior to the commencement of scheduled work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the last date written below.

Company Representative Signature and Title

Date

Company Tax ID No.

Manager
USDA Forest Service
San Dimas Technology and Development Center

Date

This **COLLECTION AGREEMENT** is hereby entered into by and between the USDA Forest Service, San Dimas Technology and Development Center, hereinafter referred to as the Forest Service, and the _____, hereinafter referred to as the Company under provisions of the Cooperative Funds Act of June 30, 1914 (16 USC 498).

A. PURPOSE:

The Company desires to have the Forest Service conduct a qualification evaluation on its model _____ locomotive spark arrester to determine whether it meets the requirements of the latest revision of Forest Service Standard 5100-1, "Spark Arresters For Internal Combustion Engines;" Association of American Railroads (AAR) Recommended Practice, "Standard for Spark Arresters for Non-Turbocharged Diesel Engines Used in Railroad Locomotives;" Society of Automotive Engineers (SAE) Recommended Practice, J342, "Spark Arrester Test Procedure for Large Size Engines."

The Forest Service is willing to perform the qualification evaluation in order to increase the number of qualified products that meet the Forest Service Standard 5100-1, AAR Recommended Practice and SAE Recommended Practice J342.

The Company is willing to advance funds to defray the costs to the Forest Service to perform such an evaluation of the Company's product.

It is mutually advantageous at this time to both parties to have tests and evaluations performed.

B. THE COMPANY SHALL:

1. Deliver a data package and necessary documentation to the San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773.
2. Make advance payments at such time as requested by the Forest Service by check payable to USDA Forest Service, addressed to 444 East Bonita Avenue, San Dimas, California 91773, drawn on a United States bank, for deposit. Such funds will be used to pay all direct and indirect costs of performing the test currently estimated at approximately \$_____. If costs exceed the amount of the initial estimate, work will be stopped and an additional advance requested.
3. Furnish their tax identification number upon execution of this agreement pursuant to the Debt Collection Improvement Act of 1996, as amended by Public Law 104-134. The Company also agrees that notice of the Forest Service's intent to use such number for purposes of collection and reporting on any delinquent amounts arising out of such Company's relationship with the Government, has hereby been given.

C. THE FOREST SERVICE SHALL:

1. Perform the necessary qualification evaluation.
2. Inform the Company of the estimated testing completion date, keep the Company informed as work progresses, and furnish the Company a final report within one month of completion of the qualification evaluation. This report will state whether or not the exhaust system meets Forest Service Standard 5100-1, AAR Recommended Practice and SAE Recommended Practice J342.

3. Annually refund to the Company any amounts in excess of the cost of doing said work, or at the request of the Company, apply such excess to subsequent agreements.

D. IT IS MUTUALLY AGREED AND UNDERSTOOD BY ALL PARTIES THAT:

1. The results of the tests may be published by the Forest Service at its discretion. The Company may publish or distribute its own publication of the test results outside its organization with the consent of the Forest Service through the Manager of the San Dimas Technology and Development Center. Publication or use of reports or results by the Company through advertising or other media will not be made in any way that implies the endorsement of the Forest Service of the product tested, or which broadens or distorts the factual findings of the tests. Any publication of these results will give appropriate recognition to both parties.
2. The Forest Service shall not be liable to the depositor for any damage incident to the performance of this agreement.
3. The principal contacts for this agreement are:

USDA Forest Service
Ralph Gonzales
444 East Bonita Avenue
San Dimas, CA 91773
(909) 599-1267 x 212

Company Principal Contact

4. This agreement is executed as of the last date shown below and expires in 1 year, at which time it will be subject to review, renewal, or expiration.
5. Either party may terminate this agreement by providing written notice prior to the commencement of scheduled work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the last date written below.

Company Representative Signature and Title

Date

Company Tax ID No.

Manager
USDA Forest Service
San Dimas Technology and Development Center

Date

This **COLLECTION AGREEMENT** is hereby entered into by and between the USDA Forest Service, San Dimas Technology and Development Center, hereinafter referred to as the Forest Service, and the _____, hereinafter referred to as the Company under provisions of the Cooperative Funds Act of June 30, 1914 (16 USC 498).

A. PURPOSE:

The Company desires to have the Forest Service conduct a waiver type evaluation on its model _____ spark arrester in the _____ position of application to determine whether it meets the requirements of Forest Service Standard 5100-1c, "Spark Arresters for Internal Combustion Engines."

The Forest Service is willing to perform the qualification evaluation in order to increase the number of qualified products that meet the Forest Service Standard 5100-1c.

The Company is willing to advance funds to defray the costs to the Forest Service to perform such an evaluation of the Company's product.

It is mutually advantageous at this time to both parties to have tests and evaluations performed.

B. THE COMPANY SHALL:

1. Deliver a data package and necessary documentation to the San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773.
2. Make advance payments at such time as requested by the Forest Service by check payable to USDA Forest Service, addressed to 444 East Bonita Avenue, San Dimas, California 91773, drawn on a United States bank, for deposit. Such funds will be used to pay all direct and indirect costs of performing the test currently estimated at approximately \$_____. If costs exceed the amount of the initial estimate, work will be stopped and an additional advance requested.
3. Furnish their tax identification number upon execution of this agreement pursuant to the Debt Collection Improvement Act of 1996, as amended by Public Law 104-134. The Company also agrees that notice of the Forest Service's intent to use such number for purposes of collection and reporting on any delinquent amounts arising out of such Company's relationship with the Government, has hereby been given.

C. THE FOREST SERVICE SHALL:

1. Perform the necessary qualification evaluation.
2. Inform the Company of the estimated testing completion date, keep the Company informed as work progresses, and furnish the Company a final report within one month of completion of the qualification evaluation. This report will state whether or not the exhaust system meets Forest Service Standard 5100-1c.
3. Annually refund to the Company any amounts in excess of the cost of doing said work, or at the request of the Company, apply such excess to subsequent agreements.

D. IT IS MUTUALLY AGREED AND UNDERSTOOD BY ALL PARTIES THAT:

1. The results of the tests may be published by the Forest Service at its discretion. The Company may publish or distribute its own publication of the test results outside its organization with the consent of the Forest Service through the Manager of the San Dimas Technology and Development Center. Publication or use of reports or results by the Company through advertising or other media will not be made in any way that implies the endorsement of the Forest Service of the product tested, or which broadens or distorts the factual findings of the tests. Any publication of these results will give appropriate recognition to both parties.
2. The Forest Service shall not be liable to the depositor for any damage incident to the performance of this agreement.
3. The principal contacts for this agreement are:

USDA Forest Service
Ralph Gonzales
444 East Bonita Avenue
San Dimas, CA 91773
(909) 599-1267 x212

Company Principal Contact

4. This agreement is executed as of the last date shown below and expires in 1 year, at which time it will be subject to review, renewal, or expiration.
5. Either party may terminate this agreement by providing written notice prior to the commencement of scheduled work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the last date written below.

Company Representative Signature and Title

Date

Company Tax ID No.

Manager
USDA Forest Service
San Dimas Technology and Development Center

Date

Appendix 1D**General-purpose and Screen Spark Arresters Test Data Sheet**

X	Spark Arrester Forms and Fees
"X" means completed	
	Collection Agreement (SDTDC 7100-13) with original signature
	Test fee in US dollars payable to USDA Forest Service
	Spark arrester test unit (Use NR for none required)
	Adapters and special tools (Use NR for none required)
	1. Spark arrester manufacturer and model
	2. SAG drawings
	3. Engineering drawings
	4. Maintenance and cleanout procedure
	5. Markings
X	Screen-type Spark Arresters
	6. Engine manufacturers identification
	7. 2- or 4-stroke cycle
	8. Engine displacement (cc)
	9. Engine horsepower (hp)
	10. Type of fuel used
	11. Engine maximum RPM
	12. Screen material alloy designation
	13. Screen mesh size
	14. Screen wire diameter
	15. Screen opening size
	16. Area of smallest restriction between exhaust port and spark arrester
	17. Effective open area of the screen
X	Disc-type Spark Arresters
	18. Minimum number of discs
	19. Maximum number of discs
	20. Torque requirement on bolts
X	100-Hour Endurance Test Only
	Description and photographs of test setup
	Test hardware with new screen
	Old Screen. It is important that the screen and exhaust assembly not be cleaned or altered in any way following the completion of the endurance test.

Signature of manufacturer's representative

Date

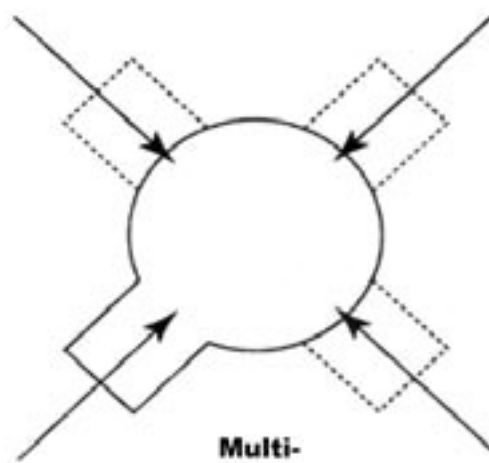
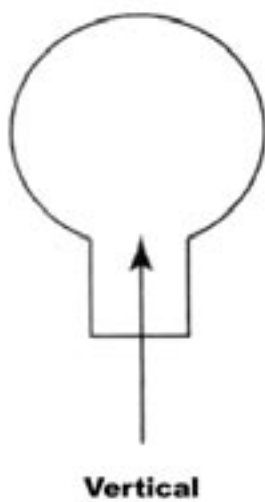
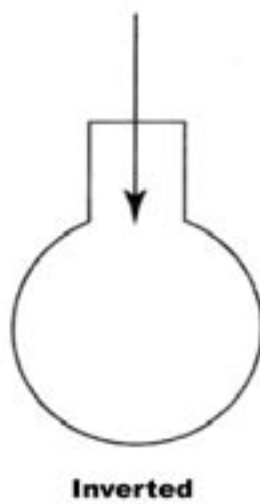
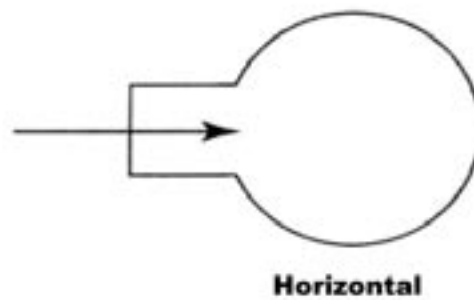
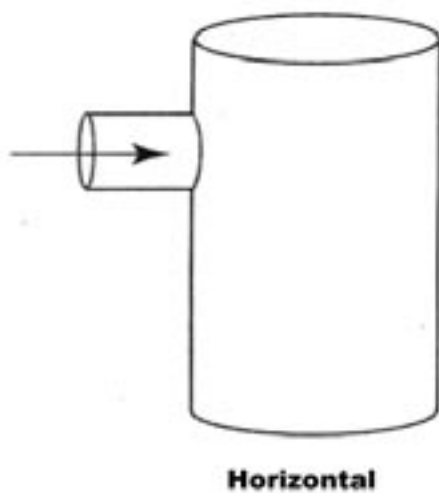
X	Requirement Description	Information
	1. Original file number or collection agreement number (if known):	
	2. Date of original qualification (if known):	
	3. Make and model of the previously qualified spark exhaust system:	
	4. Make and model of the spark arrester under waiver consideration:	
	5. Description of the differences between the two models. Use space provided below or a separate sheet.	
Screen-type Spark Arresters		
	6. Engine displacement	
	7. Engine maximum horsepower @ RPM	
	8. Smallest restriction between the exhaust port and spark arrester	
	9. 100-hour endurance test data (if needed)	

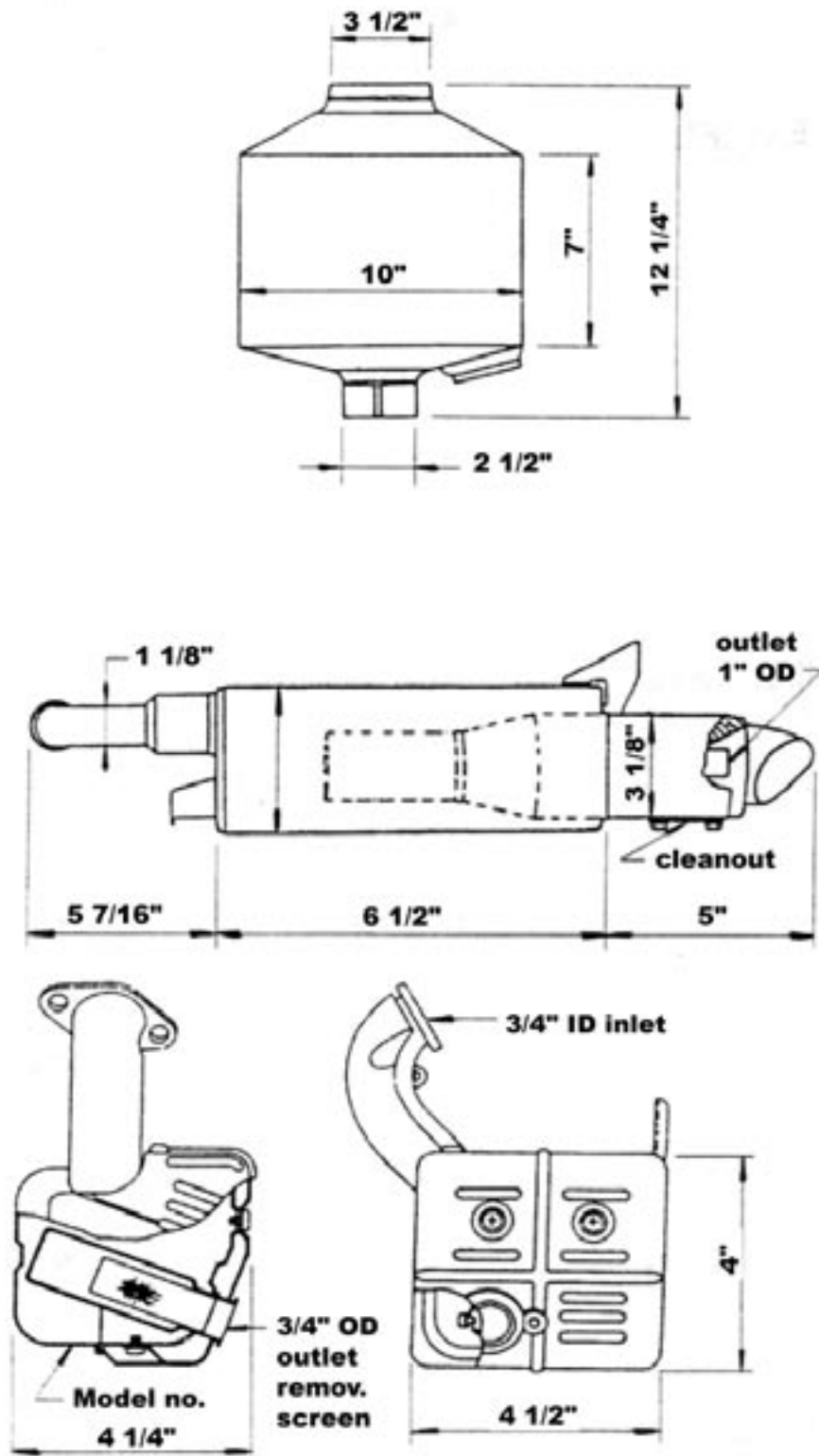
Description of differences:

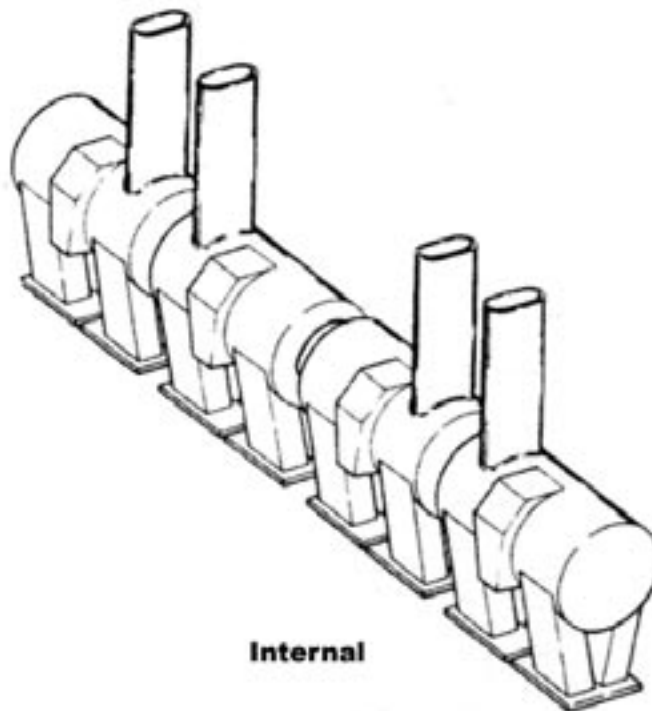
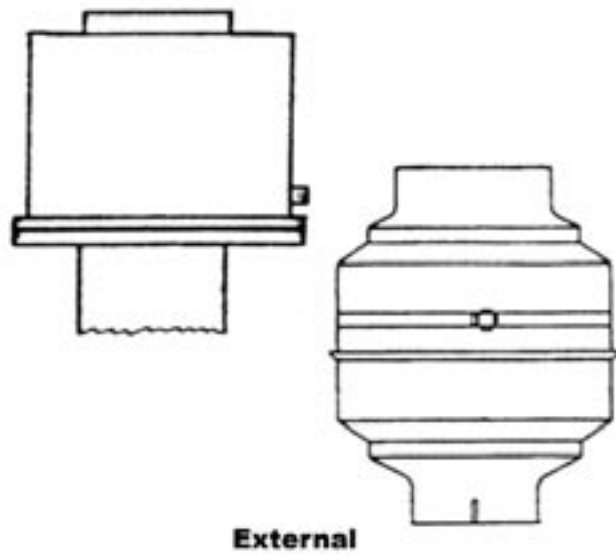
New model no:	Old model no:

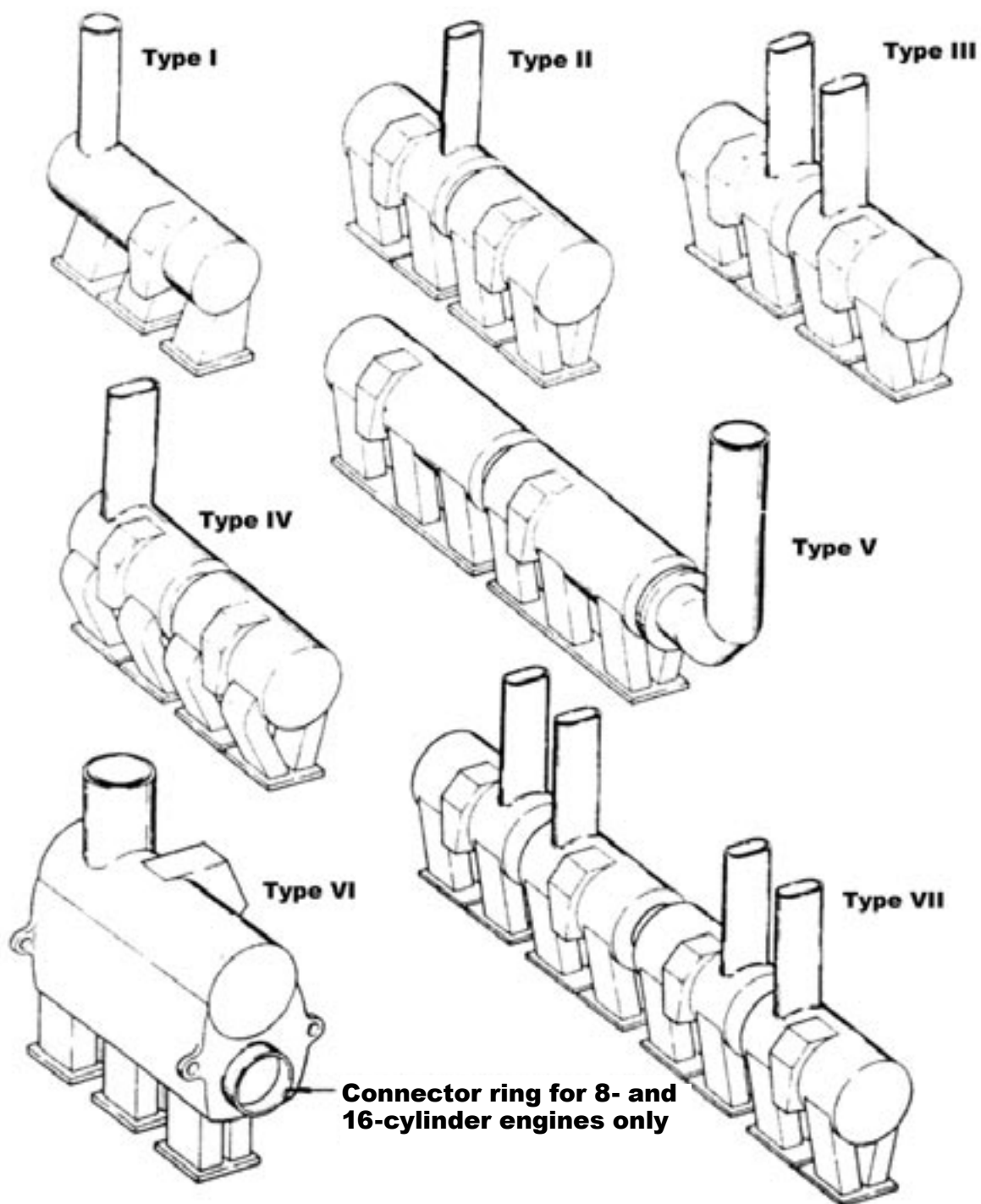
Signature of manufacturer's representative

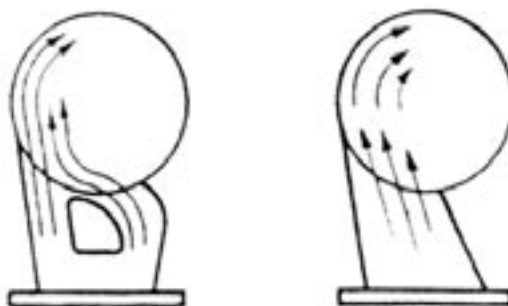
Date











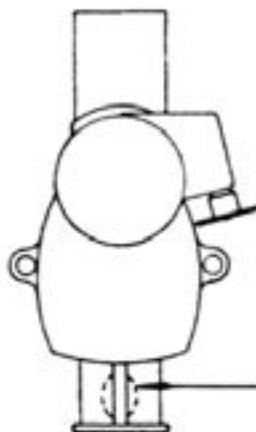
Type A - Swirl



Type B - Bent



Type C - Straight



**567 engine only - two legs
at stack end of arrester
manifold**

Type D - Short Straight

About The Authors

Ralph has a bachelor of science degree in mechanical engineering from the University of California, Santa Barbara and a master of science degree in systems management from the University of Southern California. He brings 10 years of Navy experience in design and testing to his projects at the Center. Ralph has led many projects in Fire and Aviation

during his 10 years at SDTDC, and recently took on new responsibilities as the Fire and Aviation Program Leader in July 2004.

Rebecca is currently working on a bachelor of science degree in mechanical engineering from California State Polytechnic University, Pomona.

