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INTERAGENCY AIRTANKER BOARD
Charter, Criteria, and Forms

INTERAGENCY AIRTANKER BOARD
Charter, Criteria, and Forms

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SECTION I

INTERAGENCY AIRTANKER BOARD CHARTER

PURPOSE OF THE BOARD

The purpose of the Interagency Airtanker Board, hereafter referred to as the IAB, or the Board, is to promote the safety, effectiveness, and efficiency of airtankers and helitankers.

An airtanker is defined as an aerial delivery system that includes the aircraft configured for the dispensing of fire retardant or fire suppressant material. IAB criteria shall apply to fixed-wing aircraft and helicopters intended for interagency use in the service of the cooperating State and Federal fire suppression agencies.

FUNCTIONS OF THE BOARD

1. The Board shall administer an evaluation and testing process to determine acceptable aircraft, tanks, and gate system performance.

2. The Board shall review and evaluate proposals for new or modified aircraft and approve or reject such for use by the cooperating agencies.

3. The Board shall, at their discretion, review the performance of all approved airtankers to ensure their continued conformity to the standard criteria.

4. The Board shall advise the using agencies and industry operators to promote and foster general improvement in retardant delivery systems and airtanker safety.

5. The Board shall maintain a central source of information regarding evaluation, testing, selection, and use of retardant delivery systems for agencies and industry.

6. The Board shall promote standardization and cooperation among the using agencies and the industry in all aspects of aerial delivery systems utilization.

OPERATIONS OF THE BOARD

1. Applicants proposing airtankers or tank and gate systems for approval shall be submitted to the Chairman of the Board.

2. The Board shall meet annually and at the request of the Chairman, to act on applications and proposals, and other Board business.

3. All requirements of the evaluation procedures, including aircraft modification, tank and gate design, flight and drop tests and certification shall normally be financed by the operator/proponent.

4. An equitable and workable system for evaluation, shall be used by the Board in evaluating all applicants for airtanker approval.

5. Changes to this document shall be presented to the Board. The Board's recommendations on these proposals shall be forwarded to the National Fire Aviation Coordinating Group (NFACG) for approval/disapproval. A 30 day comment period will be utilized for input from cooperators and industry.

6. An airtanker which has significant deficiencies evidenced by use shall be subject to further review by the Board for determination of its continued approval status.

7. All Board actions and unresolved issues shall be submitted to the NFACG for final approval, and to the National Association of State Foresters for review.

8. The right to accept, modify or reject of Board action shall be reserved by the NFACG and subsequently communicated to the Board Chair.

9. IAB approval status of airtankers will be communicated to the cooperating agency representatives and the aircraft owner/operator(s).

10. Nothing in this document shall preclude any agency from establishing additional requirements or operating limitations in contracting for the use of airtankers.

11. The Board may convene special working teams as needed to address issues pertaining to aerial delivery systems.

MEMBERSHIP OF THE BOARD

1. The Board shall be composed of eight voting members. Three members from the Forest Service and three members from the Department of Interior shall be appointed by the NFACG. Two members shall be appointed by the National Association of State Foresters, one to represent eastern states and one for western states.

   The Chair shall be appointed from among the eight voting members by the NFACG for a term not to exceed 4 years. Reappointment is allowed.

2. The Board may call upon advisors to perform work as needed. These advisors may come from private industry, states, research, technology and development, FAA, contracting or other technical specialists, but they shall not be voting members.

3. Membership on the Board and participation as advisors to the Board shall be with the concurrence of the individual's organization. Individual expenses incident to the Board operations shall be funded by the agency sponsoring the individual, or the company of employment.

APPROVAL PROCEDURES

The Board has established the following program as a step-by-step process of evaluation and approval of the aircraft and tanks. Responsibilities of the Proponent and the IAB are provided in these procedures. All aircraft and tanks proposed as airtankers shall be submitted by the Proponent to the IAB chairman for processing through this program. The Board shall review material submitted at each step and shall be satisfied that all requirements of a step are met before the Proponent will be allowed to proceed to the next step.

The Proponent shall bear the cost of and have the responsibility for the conduct of all tests and for preparing all submissions. The Proponent shall, at their expense, make available to the Board all required information for evaluation of the airtanker by the Board and review.

Commensurate with a FAA certification program under a Supplemental Type Certificate or Type Certificate, the Board may request routine and/or special flight test requirements as noted in the IAB criteria.

New airtankers, and older airtankers with newly modified tank and gate systems, may be operated under the IAB "Interim Approval" while field evaluations are conducted.

Procedure A: New Airtanker

Airtanker proposals to which Procedures B and C herein do not apply.

Step 1 - Basic Data

The Proponent of a new airtanker shall submit:

1. Make, model, series, date of manufacture, and serial number of the proposed aircraft.
2. Sketches or drawings of the proposed tank and gating systems.
3. An analysis of the proposed airtanker describing the characteristics of the aircraft and comparing these characteristics with the requirements and criteria contained herein.
4. An analysis of the proposed airtanker, comparing the aircraft to Aircraft Operating Criteria and Evaluation Procedures contained herein.

The Board shall review and evaluate the proposed airtanker against Requirements and operating Criteria.

Step 2 - Submission of Detailed Data

The Proponent shall submit a copy of the Type Certificate or Supplemental Type Certificate (STC) and flight manual with the required supplement(s) defining limitations and restrictions imposed on the aircraft in airtanker configuration. The Proponent shall also weigh the aircraft and submit a weight and balance report and center of gravity analysis. The Proponent shall give five working days notice to the Board before the weighing is conducted. The weight and balance report shall include loading information, maximum gross weight, Board-approved operating gross weight (defined under the Aircraft Certification paragraph of the appropriate section), maximum landing weight, zero fuel weight, and maximum allowable retardant weight (figured at 9 lbs/gal). The center of gravity (c.g.) analysis shall include the most forward and aft c.g. conditions in both the drop and cruise configurations. The proponent shall also submit a copy of the engineering drawings for the tanking systems.

The Proponent may propose increased weight or less restrictive flight performance limitations than those published in the original approved flight manual. If such weight or performance limitations are proposed, the Proponent shall submit supporting documentation and FAA approvals acceptable to the Board substantiating that such changes do not compromise airworthiness.

Step 3 - Static Test or Drop Test Evaluation

The Proponent shall submit test data that substantiates the airtanker meets the requirements of Retardant Systems paragraphs for the appropriate section.

Step 4 - Inspection by the Board

A physical inspection shall be conducted by the Board. The Proponent shall make available to the Board all engineering data and drawings of the aircraft and tank in their possession during this inspection.

Upon completion of this step, the Board shall either reject the airtanker or approve it for a one year field evaluation on fire missions.

Step 5 - Field Evaluation

The Board shall obtain operational field evaluation reports at regular intervals from the operator and the using agency during the one year evaluation period.

Step 6 - Final Acceptance or Rejection

The Board shall make a final determination of suitability and approve or reject the airtanker.

Procedure B: Airtankers Modified in Conformity to an STC Previously Approved by the Board

Step 1 - Basic Data

The Proponent of an aircraft of a previously approved configuration shall submit to the Board, the make, model, series, date of manufacture, registration number and serial number, and identify the Type Certificate or STC to which it conforms.

Step 2 - Submission of Detailed Data

The Proponent shall submit a statement of conformity (FAA form 8130-9, old 317) and Approval for Return to Service after Major Repair or Alteration (FAA form 337), demonstrating compliance with and conformity to the Type Certificate or STC, and flight manual including supplements. The Proponent shall submit a copy of the Type Certificate or STC and a flight manual with the required supplement(s) defining limitations and restrictions imposed on the aircraft in airtanker configuration.

The Proponent shall also weigh the aircraft and submit a weight and balance report and center of gravity analysis. The Proponent shall give five working days notice to the Board before the weighing is conducted. The weight and balance report shall include loading information, maximum gross weight, Board-approved operating gross weight (defined under the Aircraft Certification paragraph of the appropriate section), maximum landing weight, zero fuel weight, and maximum allowable retardant weight (figured at 9 lbs/gal). The center of gravity analysis shall include the most forward and aft c.g. conditions in both drop and cruise configurations. The proponent shall also submit a copy of the engineering drawings for the tanking systems.

The Proponent may propose increased weight or less restrictive flight performance limitations than those published in the original approved flight manual. If such weight or performance limitations are proposed, the Proponent shall submit supporting documentation and FAA approvals acceptable to the Board which substantiates that such changes do not compromise airworthiness.

Step 3 - Static Test or Drop Test Evaluation

The Proponent shall submit test data that substantiates the airtanker meets the requirements of Retardant Systems paragraphs for the appropriate section.

Step 4 - Inspection by the Board

A physical inspection shall be conducted by the Board. The Proponent shall make available to the Board all engineering data and drawings of the aircraft and tank in their possession during this inspection.

Upon completion of this step, the Board shall either reject the airtanker or approve it for a one year field evaluation period performing fire missions.

Step 5 - Field Evaluation

The Board shall obtain operational field evaluation reports at regular intervals from the operator and the using agency during the one year evaluation period.

Step 6 - Final Acceptance or Rejection

The Board shall make a final determination of suitability and approve or reject the airtanker.

Procedure C: Modification of Airtanker Previously Approved by the Board

This procedure shall be applicable to all prior approved airtankers, whether approved under these procedures or under "Grandfather" procedures (in use prior to 1970).

Step 1 - Basic Data

The Proponent of any modification to an approved airtanker, including changes in the tank and gating system, shall submit a description of the modification to the Board, for determination of whether or not the modification will affect the aerodynamics of the aircraft, flight envelope of the aircraft (load factors and operating limitations), drop characteristics, or weight and balance.

Step 2 - Determination of Requirements

The Board shall review the proposed modification and establish appropriate requirements for approval thereof.

Step 3 - Final Acceptance or Rejection

The Board shall make a final determination of suitability, and approve or reject the airtanker.

Procedure D: Reapproval of Airtanker Previously Approved by the Board

All aircraft shown on the Board approved aircraft list shall conform to the Airtanker Requirements and Criteria. To remain on the approved list, aircraft shall receive a conformity inspection by the Board to verify compliance with requirements every six years, or at the discretion of the Board.

Procedure E: Alternative Method of Compliance with Step Number 3, Procedures A & B

A Proponent may elect to demonstrate that a Static or Drop Test requirement is met by a computer simulation or other test method not provided by the government. Before the Board considers such simulation or test results, the Proponent shall provide the following to the Board:

1. A description of the proposed methodology.

2. A description of the test equipment and any and all controlling software.

4. A description of the configuration control system used by the Proponent which assures traceability of changes to all test equipment, all documented procedures, and all software used in the conduct of the test/demonstration. The configuration control system shall be documented in the company manuals or operating procedures. These documents shall accompany the system description.

5. A comparison of the proposed method and the current method used to demonstrate compliance with the requirements. This comparison shall be in terms of accuracy, precision, and repeatability.

6. A description of the company metrology system for any and all test equipment used for the conduct of the test/demonstration procedure. The metrology system shall be documented in the company manuals or operating procedures. These documents shall accompany the system description.

7. Test data from the proposed system which clearly shows the repeatability of the system. The number of tests performed to demonstrate repeatability shall be statistically significant.

Once the Proponent receives approval of his proposed methodology, the Proponent shall seek Board approval prior to each and every application. Any change in the approved procedure, equipment employed, or software employed shall require re-approval by the Board prior to its use as a means of demonstration.

SECTION II

SINGLE-ENGINE AIRTANKER REQUIREMENTS

SECTION II

SINGLE-ENGINE AIRTANKER REQUIREMENTS

**** RESERVED ****

SECTION III

SECTION III

MULTI-ENGINE AIRTANKER REQUIREMENTS

APPLICABILITY

These requirements, criteria, and evaluation procedures shall be applicable to all fixed-wing airtankers not covered by "Single Engine Airtankers Requirements".

PROPONENT REQUIREMENTS

The Proponent shall establish that:

> (**Note:** Those paragraphs below bearing an asterisk (*) shall be subject to test by the FAA during certification testing at the request of the Board.)

A. Aircraft Certification

The aircraft is certificated under Federal Aviation Regulations 14 CFR 21 and 14 CFR 25 or Foreign or Military Certification Procedures and Airworthiness Standards that provide equivalent safety.

1. A military surplus aircraft that is of a type that was originally certificated under the CAR's or FAR's as a civil aircraft shall be considered by the Board as a civil aircraft, and shall be subject to the limitations of the original type certificate, notwithstanding any less stringent limitations imposed on the aircraft by Military Regulations or Supplemental Type Certificate (STC). This paragraph shall not apply to those aircraft for which the Board has accepted and approved reports as described in Section 1, Procedure A, Step 2.

2. The aircraft is capable of being operated at Board-approved operational gross weight in accordance with operating limitations imposed by the applicable Type Certificate or STC during all approved operations. Board approved operational weight shall include the following:

   Empty weight in airtanker configuration.
   Minimum required crew and flight kit.
   Full retardant payload, being the maximum payload for which the Proponent seeks approval.
   Two and one-half hours of fuel at 55 percent METO power in cruise at 5,000 ft MSL, with - fuel type to be used as an airtanker. If aircraft normally uses jet engines for take off and climb then fuel flow for the jet engines will be added for 15 minutes of the two-and-one-half hours.
   All other necessary fluids, i.e., engine oil, hydraulic fluid, water-methanol, etc.

3. The aircraft has a limit load factor of not less than 2.5 g positive and 1.0 g negative, in cruise flight.

B. Aircraft Ground Roll

Aircraft at Board-approved operational gross weight (not to exceed FAA approved gross weight) is able to takeoff at 5,000 ft pressure altitude with zero wind and a temperature of ISA +30 F with a ground roll not to exceed 6,000 ft. With a critical engine failure at lift-off, aircraft is able to continue the takeoff and maintain at least 100 fpm rate of climb, while retaining the retardant load. (The landing gear may be retracted.)

C. Congested Area

The proposed airtanker is capable of meeting the constraints of FAR 137.51 (b) (5) i and ii, "Operation Over Congested Areas," at the atmospheric conditions and Board-approved operational gross weight, specified in B herein, not to exceed approved gross weight, with a ground roll not to exceed 6,000 ft.

D. Engine

Aircraft is multi-engine.

E.* Retardant Release Effect on Flight Conditions

Release of retardant in all normal drop configurations and at all normal drop speeds does not result in dangerous or seriously objectionable flight conditions.

1. The minimum drop speed is not less than the V_{mc} (minimum control speed), nor 1.25 V_s (stall speed) both speeds being evaluated in the drop configuration.

2. The maximum drop speed does not exceed V_a (design maneuvering speed).

3. Longitudinal stability is positive at drop configuration throughout the drop speed range.

4. Stick-force gradients are positive at all aircraft accelerations up to applicable load limits, at all speeds, and in all approved configurations. (It is also desirable that these gradients be linear.)

F.* Asymmetric Power

Asymmetric power complies with MIL-F-8785A, Section 3.4.12 or 14 CFR 25.149 (FAR 25.149).

G.* Climb Rate

Aircraft is capable of 100 FPM rate of climb at Board-approved operational gross weight, at 10,000 ft pressure altitude, ISA +20 F with METO power.

H. Descent

Aircraft is capable of descending at Board-approved operational gross weight along a 13 percent (7.41°) slope for 1 minute and leveling off at 3,000 ft pressure altitude in the drop configuration without exceeding maximum drop speed.

I.* Stall Warning

At forward and aft c.g., at approach to stall, there is clear and distinct warning to the pilot, and the aircraft has no adverse stall characteristics.

J.* Longitudinal Control Force

Longitudinal control force does not exceed 35 lb for all approved maneuvers, including drops.

K.* Aircraft Dynamic Stability

Aircraft dynamic stability is as required in MIL-F-8785A, Sections 3.3.5, 3.3.6, and 3.4.1. or 14 CFR 25.177, 25.181 (FAR 25.177, 181).

L.* Carbon Monoxide/Dioxide

Carbon monoxide concentration in cockpit, in flight condition, does not exceed 50 ppm. Carbon dioxide concentration in cockpit does not exceed 3 percent by volume at sea level.

M. Aircraft Production

Aircraft is in current production, or available in sufficient quantities to support the proposed number of flyable airtankers.

N. Landing Weight Capability

Aircraft in proposed tank configuration shall be capable of landing with 2-1/2 hours of fuel (as specified in A.2. of this section) and a minimum of 80 percent of the retardant load.

O. Field of Vision

Field of vision shall be unobstructed. The visibility of an airtanker shall be quantified using the procedure described in Airtanker Cockpit Laser Visibility Evaluation Device, Revision I, 1992, USDA Forest Service, Technology and Development Center, San Dimas, CA 91773.

A plot of cockpit visibility shall be made, showing the limits of clear visibility in angular coordinates. The angular area of clear unobstructed view shall be measured relative to the reference planes. The reference planes shall be measured parallel to the horizon, and to the aircraft's longitudinal axis, which intersect at the point which is at the normal height of the pilot's eyes and above the center of his seat. Normal flight attitude shall be used. Any appropriate scale shall be used for the plot to represent degrees of visibility. All clear vision windows forward of a lateral plane through the pilot's head and perpendicular to the horizon shall be plotted. Obstructions by wings, nacelles, etc., shall be shown. Propeller blades shall be omitted from the plot. Plots shall be evaluated to determine the total area shown for clear visibility in units of degrees squared (deg^2). The minimum vision area shall be 4870 deg^2.

P. Retardant Systems

1. General

a. Requirement: All tank systems do not leak when loaded with water to a volume equivalent to the volume of retardant at the maximum certificated retardant load. Following initial loading, the tank system is capable of sitting loaded as described above a minimum of one week without leaking more than 3-1/2 gallons (one half gallon in 24 hours).

Procedure: Load tank to certificated amount using approved meter or weighing system. Determine the leakage occurring over a 14-hour period (usually this will be overnight). The leakage volume for the 14-hour period shall not exceed 0.3 gallons.

b. Requirement: All tanks are equipped with an independent controlled and operated emergency dump system enabling the entire load to be dropped in less than 6 seconds. This system may use only mechanical, pneumatic, or hydraulic pressure for operation. Emergency systems operated by pneumatic or hydraulic pressure are isolated from the normal tank system pressure.

Normal function or failure of the normal system pressure does not affect the emergency system pressure. Emergency systems dependent on normal operating aircraft or tank system for initial charge have a pressure gauge or indicator readily visible to the crew. Emergency systems dependent on precharged bottles have a positive means of checking system charge during preflight.

The primary emergency dump control is positioned within easy reach of the pilot and co-pilot while strapped in their respective seats. Electrically operated controls are wired directly to a source of power isolated from the normal aircraft electrical buss and protected by a fuse or circuit breaker of adequate capacity.

Procedure: Operate the emergency dump by operating the primary emergency dump switch(es) as described above. Observe that the requirements above are met.

c. Requirement: All tanks have the capability of being off-loaded through standard 3 inch Kamlock or equivalent couplers. Upon off loading, the amount of retardant remaining in the tank is no more than 7 percent of the total approved load capacity.

Procedure: Demonstrate the off-load capability by connecting a 3 inch diameter hose and off loading water from the tank.

d. Requirement: All tank doors are closeable in flight.

Procedure: Operate doors under static conditions. (Flight tests will be required at the discretion of the Board; if failures of the system cause the Board to doubt its operative ability in flight.)

e. Requirement: All retardant tanks are (1) capable of being filled in conformity with the approved retardant load through a 3 inch diameter single or dual Kamlock fittings, on either side of the aircraft or from the tail, at an average fill of no less than 500 gpm, (2) that there are sufficient cross flows so that the retardant will be level in all compartments within 30 seconds after the loading pump is stopped, and (3) no one or more compartments fill faster than others such that retardant overflows from the tank (other than level indicator holes) before the approved volume is reached.

Procedure: Fill the tanks to the approved volume at 500 gpm and check for even fill levels in each tank compartment.

f. Requirement: All tanks with compartments which can be sequenced individually in the normal drop configuration are constructed so as to eliminate leakage from one compartment to the other when one of the compartments has been evacuated.

Procedure: Fill all compartments to the level for a maximum approved load. Normally activate individual compartments in their normal sequence, checking each of the evacuated compartments for leaks from adjoining tanks. Leakage from adjoining tanks producing a combined flow of greater than 1 gpm will constitute leakage within the means of this paragraph.

g. Requirement: Opening of the doors is through primary switches or other mechanism located on the control yoke or stick.

Procedure: Visually check the activating switches as the tank and gate system is operated for static test drops.

2. Compartment Size and Flow Rate/Performance

Discussion: The best information available indicates that the retardant coverage levels required to suppress typical fires occurring in forest and rangelands varies between 0.5 and 10.0 gpc (gallons per hundred square feet) depending on the fuels, weather, fire behavior, etc. The coverage levels adequate for most fires and conditions are between 1 and 4 gpc. Since the flow rate from an aerial delivery system is the most significant controllable factor in determining the level of retardant coverage that is obtained, the line building efficiency in individual airtankers can be increased by incorporating the ability to regulate the flow rate of the retardant during release at different release volumes. In conventional retardant delivery systems the retardant load is divided into several compartments. The compartments can be released individually or multiple compartments can be released simultaneously increasing both the volume and flow rate and hence coverage level of the release. Multiple compartments can also be released sequentially at the appropriate release interval to increase the volume while maintaining the coverage level (flow rate) of a single compartment release. In other systems, such as the constant flow ones, different flow rates producing the desired coverage levels are selected directly.

The line building performance of any retardant delivery system at any of the various coverage levels can be determined during a drop test where the airtanker flies over a sampling grid and the ground pattern is measured directly. For most delivery systems the relationship between flow rate and the resulting ground pattern distribution is well enough defined that expensive testing of this type is not necessary. For these systems the ability to measure delivery system flow rate statically and predict retardant coverage levels provides a practical method by which tank performance and flexibility can be specified and evaluated.

Using knowledge of volume, flow rate, release combinations and their relationship to retardant coverage levels the following flow rate requirements have been specified for conventional delivery systems - those systems whose load is divided into compartments which can be released simultaneously to provide additional flow rates. Static testing to determine flow rates will also be used to evaluate the performance of delivery systems which produce different volumes by methods other than multiple compartment releases. Flow rate requirements for these systems, equivalent to the requirements for conventional systems, will be determined on a case-by-case basis depending on the individual system's design and capabilities.

In-flight drop testing is required only for delivery systems where the ground pattern performance cannot be predicted from the measured flow rates because the data to form this relationship does not exist.

a. Release size/type requirement for all airtankers: All tanks shall be capable of making multiple equal volume drops in accordance with the following criteria. For conventional tanks, an individual compartment shall not release less than 200 gallons. Additionally, where two compartments use opposing doors to control the flow, the two compartments shall be considered as one.

   Finally, the minimum number of equal volume drops shall be in accordance with the table below. Because of their inherent capability, Proponents of nonconventional tanks shall define the number of equal volume releases for which they seek approval, provided the minimum number is not less than as shown below based on the size of the tank.

Volume of airtanker (gal)	Minimum number of equal volume drops/releases[1*]
800 to 999	2 (shall make 2 or more equal releases)
1000 to 2499	4 (shall make 4 or more equal releases)
2500 to 3999	6 (shall make 6 or more equal releases)
4000 and above	8 (shall make 8 or more equal releases)

Tanking systems using an odd number (3,5,7, etc.) of equal compartments may be undesirable due to lack of release symmetry, unless they are in-line (see para. P.3 of this section).

Based on the number of equal releases defined above, the airtanker shall have the capability of dividing its load into the following number of equal partial releases:

[1*] For any series of partial releases, in order for the released volumes to be considered equal, the measured volumes shall not vary (low to high value) greater than 12 percent of the average volume for the series. (See Section VII, note 2)

Number of Equal Releases	Number of Equal Drops/ Releases From a Full Load
2	1 and 2
4	1, 2, and 4
6	1, 2, 3 and 6
8	1, 2, 4 and 8
10	1, 2, 5 and 10
12	1, 2, 3, 4, 6 and 12
16	1, 2, 4, 8 and 16

Procedure: Accurately measure compartment/tank capacity while the airtanker is parked in a normal loading attitude. Check existing marked fill levels and permanently mark new ones outside and inside the compartments/tank when possible.

Review the retardant delivery system of the airtanker and determine that the airtanker is capable of making the number and types of releases specified in the above tables. Calculate and/or measure the volume of fluid released during each of the required partial releases. This may involve calculating and measuring with a volumetric meter the volume of each compartment, or calculating the volume released from the flow data collected during static testing. Calculate the average drop volume. Assure that the variation in measured volumes (difference between the low and high readings) is less than 12 percent of the average drop volume for each drop type.

b. Flow rate requirement for conventional airtankers: The size of the individual compartment, the number of compartments, the number of flow restrictions, and required flow rate range shall conform to the following criteria for drop volumes of one half or less of the total tank volume:

Individual Compartment Volume	Number of Compartments Used			
	2	3,4	5,6	7 & greater
200-300	3(2,3,4)	2(2,4)	2(2,3 or 4)	2(2,3 or 4)
301-400	3(1,3,4)	2(1,4)	2(1,3 or 4)	2(1,3 or 4)
>400	3(1,2, or 3,4)	2(1,4)	2(1,3 or 4)	2(1,3 or 4)

The first number is the number of different flow rates required for each compartment, the numbers in parentheses are the required flow rates ranges from the flow rate table below (Page 8). For all drop types the flow shall be reproducible and within any drop type the average flow rates between compartments may vary by no more than the maximum allowable difference given below.

The average flow rate shall accurately represent the flow rate at which the majority of the retardant is exiting the retardant delivery system and there shall be no significant reduction in the flow rate during the established portion of the release which could cause a gap in the retardant line at the desired coverage level.

Flow rate range	Average Flow rate (gps)	Maximum allowable Difference (gps)
1	100 - 150	20
2	151 - 250	35
3	251 - 400	60
4	401 and greater	100

Procedure: Measure flow rates with the aircraft at flight attitude by monitoring floats which follow the top surface of the water when the tank doors are opened. Monitor floats for all normal drop combinations and flow restrictions. Calculate flow rates using a computer programmed algorithm which combines float travel distance and time with tank geometry.

Average flow rates shall fall within the appropriate ranges and the differences between the average flow rates for all compartments shall be no greater than the allowable differences given in the table. Comparisons of replicate tests will establish reproducibility. Plots of flow rate versus time shall be used to establish that the average flow rate accurately represents the drop and that there are no significant reductions in the flow rate during the established portion of the release that will cause gaps in the retardant line at the desired coverage level. For examples to help in explaining this requirement see Section VII, note 1.

c. Flow rate/performance requirement for nonconventional airtankers: If the delivery system is not of the conventional type, that is it uses a delivery concept other than dropping increments of different volumes at varied release intervals to build a continuous retardant line, the system shall demonstrate that it has the ability to produce the following lengths of line per 100 gallons of load released. (Drops shall be made at a 200-foot drop height and a defined drop speed within operational limits of the airtanker).

Minimum Length of Line per 100 Gallons

Coverage Level (gpc)	Airtanker Tank Size - Gallons				
	>1399	800-1399	600-799	400-599	200-399
	Feet of Line per 100 Gallons				
0.5	125	125	125	125	125
1.0	75	75	75	75	75
2.0	50	50	50	50	50
3.0	30	30	30	20	15
4.0	20	20	20	5	0
6.0	15	10	5	0	0
8.0	7	5	0	0	0

This performance shall be determined using a cup/grid system for determining pattern performance unless an accurate method of determining performance for the system exists based on the flow rate/performance information of a similar retardant delivery system.

The flow/performance of the retardant delivery system shall be reproducible for all drop types. The average flow rates for releases necessary to meet the coverage level requirements of the same volume and flow control setting shall vary within a range (low to high measured value) which is not greater than 15 percent of the mean value flow rate for the drop type. Drop types meeting the coverage level requirements will be identified.

Procedure: Drop test the airtanker using a sampling grid to directly determine the ability of the airtanker to produce the required line lengths, or make the determination by comparing the flow measured during the static test with other flow/performance data from a similar retardant delivery system.

During static tests measure flow rates by monitoring floats which follow the top surface of the water when tank doors are opened. Monitor floats for all normal drop types. Calculate flow rates using computer programmed algorithm which combines float travel distance and time with tank geometry. Replicate static tests will be used to establish that the performance at all drop types is reproducible. The average flow rates calculated from the static test data will also be compared within all drop types to ensure that they vary by no more than the allowable difference. The allowable difference is calculated as 15 percent of the mean value flow rate measured for the drop type.

3. Multiple Compartment Drops

a. Requirement: For drop combinations where two or more compartments are opened simultaneously, the rules as shown in Figure 1 shall be followed unless the drop configuration results in a weight distribution which causes the c.g. to be outside the acceptable flight envelope. Any multiple compartment drop that results in a noncontiguous, non-rectangular configuration is considered unacceptable.

   Procedure: Check all compartment drop combinations visually during static test drops.

4. Venting

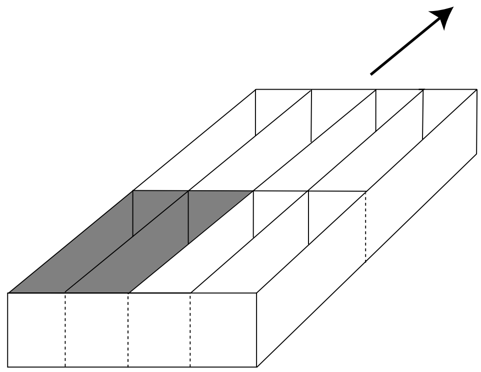
Discussion: The vent area controls the flow of air into the tank to replace the exiting retardant. Insufficient venting adversely affects the flow rate, it can cause “coke bottling” or hesitation in the flow resulting in thin spots in the ground pattern. The amount of venting required in order not to adversely affect flow varies depending on several factors including flow rate, tank head height and the amount of air space above retardant at the start of the release.

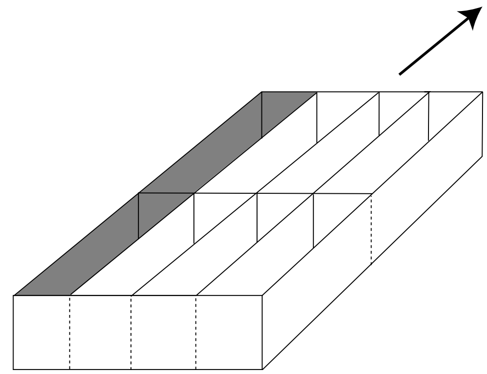
a. Requirement: Vents are constructed so that no retardant leakage or slosh-over occurs during taxi or take-off.

   Procedure: Make a visual check and measurements of vent construction, and check the height of the retardant in a tank filled to the IAB level for distance below vent outlets. If clearance or vent door construction is questionable, taxi the aircraft when loaded at the maximum approved load and observe for slosh-over or leakage.

b. Requirement: The vent area for any compartment or tank is such that when the retardant is released from any compartment or combination of compartments for volumes one half or less of the total tank volume, resulting negative pressures do not adversely affect the flow. The negative pressure shall be distributed so that flow is uniform throughout the compartment or tank. Any tank with static or in-flight negative pressures in excess of 0.25 psi must exhibit uninterrupted, reproducible and near linear flows.

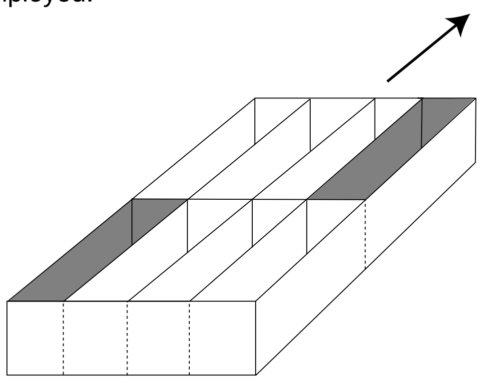
   Procedure: Check negative pressure with a pressure transducer during static test drops. If any section of a compartment or tank exhibits negative pressures greater than 0.25 psi, for any

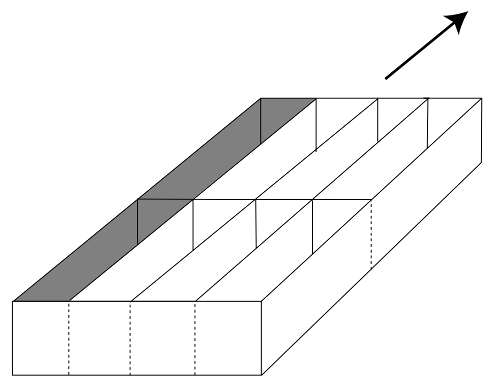




Unacceptable **Acceptable**

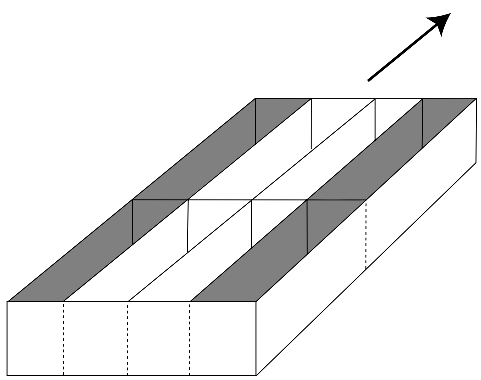
1. When two or more compartments are dropped simultaneously (non-salvo) and a choice of dropping forward and aft compartments, versus side-by-side compartment, is possible, the forward-aft combinations shall be employed.

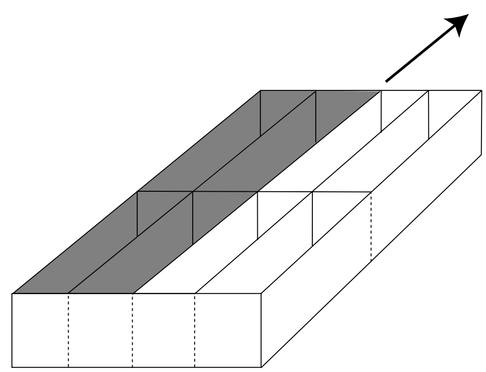




Unacceptable **Acceptable**

2. Forward and aft compartment dropped simultaneously shall be in line with one another.





Unacceptable **Acceptable**

3. Side-by-side compartments dropped simultaneously shall be oriented in a manner to minimize separation.

Figure 1.—*Rules of configuration for multiple compartment drops.*

drop type, the examination of flow and other test data will be used to determine the presence or absence of uninterrupted, reproducible, and near linear flows.

5. Doors

Discussion: The door size, shape, and opening speed are all parameters which can influence the retardant flow rate and direction from a tank. Many combinations of these parameters may provide acceptable flow rates as specified in paragraph P.2 of this section. The most desirable combination, however, should minimize the fluid frontal area, not significantly deflect the fluid, while providing this flow rate. Thus a long, narrow tank is to be preferred over a square tank; fast opening doors are preferable unless opposed doors, flow straighteners, or some other means of preventing deflection are employed. Opposed doors may be mechanically linked to ensure equal opening angles.

a. Requirement: Any door or combination of doors shall not laterally deflect the flow of retardant from the tank.

(1) Unopposed doors without flow straighteners - the door shall open within 10 degrees of vertical in 0.50 seconds or less.

(2) Unopposed doors using flow straightener devices - the flow straighteners shall be configured in a manner to prevent lateral deflection to the exiting fluid during the main portion of the drop (after the first 10 percent and before the last 10 percent of volume is released).

(3) Opposed flow control doors - the open angle for opposed doors shall differ by no more than 10 percent after the initial 10 percent of the load is released.

b. Requirement: Parallel doors, other than opposed doors used to control flow, shall be hinged on the outboard side away from the tank center line.

c. Requirement: When multiple doors are opened simultaneously, either as opposed doors to control flow or for multiple compartment drops, they shall begin to open within 0.05 seconds of each other.

Procedure: Door angle as a function of time is recorded by attaching a potentiometer to the tank coaxially with the door hinge. An arm attached to the potentiometer contacts the door during the drop. Video is also taken of the drop to record the door position and fluid motion of the retardant. The measured door opening times and video are also used as indicators in identifying problems in flow rate and sequencing. Deflection is examined from video taped static drops, video digitizing equipment may be used to measure the deflection angle.

6. Tank drop controllers

Discussion: The flexibility and accuracy inherent to retardant delivery systems meeting the flow rate/performance requirements is obtained operationally through the tank drop controllers. The controllers allow for selection of the parameters particular to the delivery system such as flow rate, drop type or volume, and time interval between releases (intervalometer) to produce continuous lines of retardant at the various coverage levels. Several factors influence what release information will produce the desired performance including airspeed, drop height, wind speed and direction, and G-forces. In its simplest form the pilot takes these factors into account and sets the actual release information. More complex drop controllers use computer look-up tables and algorithms to determine the release information from pilot inputs of coverage level and volume. In state-of-the-art controllers environmental and flight conditions, collected from on-board sensors and/or pilot input, are also evaluated in determining the best release.

a. Requirement: Each airtanker shall be equipped with a tank drop controller actuated by a positive returning primary drop switch providing door/volume selection options corresponding to the requirements in paragraph P.2.a of this section and flow rate/coverage level selection options corresponding to the requirements in paragraph P.2.b or c in this section, whichever is applicable to the delivery system. The controller shall provide volume and flow rate accuracy and repeatability to within the limits specified in the requirements.

b. Requirement: An intervalometer is required in any tank drop control system with more than one compartment. The intervalometer shall permit selection of time intervals for the automatic sequence of compartment releases at 0.1 seconds intervals over a time range longer than the time required to empty all compartments at all volume and flow rate settings. The accuracy and repeatability of the intervalometer shall be plus or minus 0.05 seconds at any setting.

c. Requirement: A drop control selector with continuous automatic repeating of the programmed release information (flow rate/coverage level, door number combination/volume, and if applicable time interval) as long as the drop switch is held in the actuated position is required. If the primary drop switch is released during the automatic timed sequence of releases, the controller shall stop the drop at or before the next volume increment is released.

d. Requirement: Arming switch or switches are required to prevent release of door by inadvertent actuation of the primary drop switch.

e. Requirement: Indicator(s) and/or annunciator panel positioned within clear view of the pilot and co-pilot to indicate those compartments that are armed and whether or not they have been released or the volume remaining in tank/compartment in systems capable of making other than full tank/compartment releases. The indicators shall show the flow rate/coverage level setting, drop type/volume setting, and if applicable time interval between releases. The indicators shall also indicate any open doors.

f. Requirement: The information programmed into the microprocessor controllers must be accurate and the latest available.

Procedure: Demonstrate that the tank controller has the appropriate settings and indicators. Accurately measure intervalometer timing, accuracy and repeatability with an electronic test instrument connected in parallel with the door opening solenoids. Flow rate data collected under paragraph P.2 of this section will be used to determine accuracy and repeatability of flow rate settings. Programmed data will be submitted to the testing and evaluation team, if acceptable the programmed data will be verified during static testing.

7. Tank fill-gauge

a. Requirement: A positive level gauge or indicator is provided that shows when each compartment is filled to the certified load limit, or when each compartment is at predetermined partial load points if reduced loads are used. The gauge or indicator is readily visible to the loading crew at the loading points and the tank capacity of each loading level clearly marked.

Procedure: Check fill level gauges by metering accurate volumes of water while the aircraft is in its normal filling attitude. Visually evaluate permanent markers placed to indicate the certified load limit levels.

SECTION IV

MULTI ENGINE AMPHIBIOUS AIRTANKER REQUIREMENTS

SECTION IV

MULTI-ENGINE AMPHIBIOUS AIRTANKER REQUIREMENTS

**** RESERVED ****

SECTION V

H E L I T A N K E R R E Q U I R E M E N T S

SECTION V

HELITANKER REQUIREMENTS

APPLICABILITY

These requirements, criteria, and evaluation procedures shall be applicable to all helicopters designated as helitankers used in fire suppression activities upon which are installed a fixed internal or external tank or a bucket which is slung beneath the aircraft.

FIXED TANKS

A. Interagency Airtanker Board (IAB) Requirements

The following for each proposed helitanker shall be submitted to the Board.

1. Type Certificate or Supplemental Type Certificate (STC) including installation of the fixed tank(s).

2. Flight manual/supplement showing FAA limitations while equipped as a helitanker.

3. Weight and balance showing loading information gross weight, retardant load weight and balance with retardant tanks empty, loaded and all possible partial load situations.

B. Aircraft Certification

Helicopters shall be certified under FAR Parts 21.25 “Restricted Category,” 27 “Normal Category,” or 29 “Transport Category.” Helicopter shall be operated in accordance with operating limitations imposed by the approved flight manual.

1. The aircraft is capable of being operated at Board-approved operational gross weight in accordance with operating limitations imposed by the applicable Type Certificate or STC. Board approved operational weight shall include the following:

   Empty weight in the helitanker configuration.
   Minimum required crew and flight kit.
   Full retardant payload, being the maximum payload for which the Proponent seeks approval.
   Weight of one and one-half hours of fuel.
   All other necessary fluids, i.e., engine oil, hydraulic fluid, water-methanol, etc.

C. Retardant Systems

NOTE: If the Proponent wishes to substantiate compliance with this section using procedures other than those given, they shall submit these procedures to the Board for approval.

1. General

a. Requirement: All tank systems do not leak when loaded with water to a volume equivalent to the volume of retardant at the maximum certificated retardant load. Following initial loading, the tank system is capable of sitting loaded as described above a minimum of one week without leaking more than 3-1/2 gallons (one half gallons in 24 hours).

Procedure: Load tank to certificated amount using approved meter or weighing system. Determine the leakage occurring over a 14 hour period (usually this will be overnight). The leakage volume for the 14 hour period shall not exceed 0.3 gallons.

b. Requirement: All tanks are equipped with an independent controlled and operated emergency dump system enabling the entire load to be dropped in less than six seconds. This system may use only mechanical, pneumatic, or hydraulic pressure for operation.

Emergency systems operated by pneumatic or hydraulic pressure are isolated from the normal tank system pressure.

Normal function or failure of the normal system pressure does not affect the emergency system pressure. Emergency systems dependent on normal operating aircraft or tank system for initial charge have a pressure gauge or indicator readily visible to the crew. Emergency systems dependent on precharged bottles have a positive means of checking system charge during preflight.

The primary emergency dump control is positioned within easy reach of the pilot and co-pilot while strapped in their respective seats. Electrically operated controls are wired directly to a source of power isolated from the normal aircraft electrical bus and protected by a fuse or circuit breaker of adequate capacity.

Procedure: Operate the emergency dump by operating the primary emergency dump switch(es) as described above. Observe that the requirements above are met.

c. Requirement: All tanks have the capability of being off-loaded through standard 3 inch Kamlock or equivalent couplers. Upon off-loading, the amount of retardant remaining in the tank is no more than 7 percent of the total approved load capacity.

Procedure: Demonstrate the off-load capability by connecting a 3 inch diameter hose and off-loading water from the tank.

d. Requirement: All tank doors are closable in flight.

Procedure: Operate doors under static conditions. (Flight tests will be required at the discretion of the Board; if failures of the system cause the Board to doubt its operative ability in flight.)

e. Requirement: All retardant tanks are (1) capable of being filled in conformity with the approved retardant load through a 3 inch diameter single or dual Kamlock fittings, on either side of the aircraft, at an average fill of no less than 500 gpm, (2) that there are sufficient cross flows so that the retardant will be level in all compartments within 30 seconds after the loading pump is stopped, and (3) no one or more compartments fill faster than others such that retardant over flows from the tank (other than level indicator holes) before the approved volume is reached.

Procedure: Fill the tanks to the approved volume at 500 gpm and check for even fill levels in each tank compartment.

f. Requirement: All tanks with compartments which can be sequenced individually in the normal drop configuration are constructed so as to eliminate leakage from one compartment to the other when one of the compartments has been evacuated.

Procedure: Fill all compartments to the level for a maximum approved load. Activate individual compartments in their normal sequence, checking each of the evacuated compartments for leaks from adjoining tanks. Leakage from adjoining tanks producing a combined flow of greater than 1 gpm will constitute leakage within the means of this paragraph.

g. Requirement: Opening of the doors is through primary switches or other mechanism located on the collective or cyclic.

Procedure: Visually check the activating switches as the tank and gate system is operated for static test drops.

2. Compartment Size and Flow Rates/Performance

Discussion: The best information available indicates that the retardant coverage levels required to suppress typical fires occurring in forest and rangelands varies between 0.5 and 10.0 gpc (gallons per hundred square feet) depending on the fuels, weather, fire behavior, etc. The coverage levels adequate for most fires and conditions are between 1 and 4 gpc. Since the flow rate from an aerial delivery system is the most significant controllable factor in determining the level of retardant coverage that is obtained, the line building efficiency in individual helitankers can be increased by incorporating the ability to regulate the flow rate of the retardant during release at different release volumes. In conventional retardant delivery systems the retardant load is divided into several compartments. The compartments can be released individually or multiple compartments can be released simultaneously increasing both the volume and flow rate and hence coverage level of the release. Multiple compartments can also be released sequentially at the appropriate release interval to increase the volume while maintaining the coverage level (flow rate) of a single compartment release. In other systems, such as the constant flow ones, different flow rates producing the desired coverage levels are selected directly.

Unlike fixed wing aircraft, helicopters may produce the desired coverage levels by greatly varying ground speed over the target, including spot drops.

The performance of any retardant delivery system at building line of the various coverage levels can be determined during a drop test where the helitanker flies over a sampling grid and the ground pattern is measured directly. For most delivery systems the relationship between flow rate and the resulting ground pattern distribution is well enough defined that expensive testing of this type is not necessary. For these systems the ability to measure delivery system flow rate statically and predict retardant coverage levels provides a practical method by which tank performance and flexibility can be specified and evaluated.

Using knowledge of volume, flow rate, release combinations and their relationship to retardant coverage levels the following flow rate requirements have been specified for conventional delivery systems - those systems whose load is divided into compartments which can be released simultaneously to provide additional flow rates. Static testing to determine flow rates will also be used to evaluate the performance of delivery systems which produce different volumes by methods other than multiple compartment releases.

Flow rate requirements for these systems, equivalent to the requirements for other systems, will be determined on a case-by-case basis depending on the individual system's design and capabilities. In-flight drop testing is required only for delivery systems where the ground pattern performance cannot be predicted from the measured flow rates because the data to form this relationship does not exist.

a. Release size/type requirement: All tanks shall be capable of making multiple equal volume drops in accordance with the following criteria. For conventional tanks, an individual compartment shall not release less than 200 gallons. Additionally, where two compartments use opposing doors to control the flow, the two compartments shall be considered as one. Finally, the minimum number of equal volume drops shall be in accordance with the table below. Because of their inherent capability, proponents of non-conventional tanks shall define the number of equal volume releases for which they seek approval, provided the minimum number is not less than as shown below based on the size of the tank.

Volume of airtanker (gallons)	Minimum number of equal volume drops/releases[2]*
800 to 999	2 (shall make 2 or more equal releases)
1000 to 2499	4 (shall make 4 or more equal releases)
2500 and above	6 (shall make 6 or more equal releases)

Tanking systems using an odd number (3,5,7, etc.) of equal compartments may be undesirable due to lack of release symmetry, unless they are in-line (see paragraph C.3 in this section).

Based on the number of equal releases defined above, the helitanker shall have the capability of dividing its load into the following number of equal partial releases:

Number of Equal Releases	Number of Equal Drops/ Releases From a Full Load
2	1 and 2
4	1, 2, and 4
6	1, 2, 3 and 6
8	1, 2, 4 and 8
10	1, 2, 5 and 10
12	1, 2, 3, 4, 6 and 12
16	1, 2, 4, 8 and 16

Procedure: Accurately measure compartment/tank capacity while the helitanker is parked in a normal loading attitude. Check existing marked fill levels and permanently mark new ones outside and inside the compartments/tank when possible.

Review the retardant delivery system of the helitanker and determine that the helitanker is capable of making the number and types of releases specified in the above tables. Calculate and/or measure the volume of fluid released during each of the required partial releases. This may involve calculating and measuring with a volumetric meter the volume of each compartment, or calculating the volume released from the flow data collected during static testing. Calculate the average drop volume. Assure that the variation in measured volumes (difference between the low and high readings) is less than 12 percent of the average drop volume for each drop type.

b. <u>Flow rate/performance requirement:</u> The system shall demonstrate that it has the ability to produce the following lengths of line per 100 gallons of load (at a 200-foot drop height and a defined drop speed within operational limits).

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[2]* For any series of partial releases, in order for the released volumes to be considered equal, the measured volumes shall not vary (low to high value) greater than 12 percent of the average volume for the series. (See Section VII, note 2)

Minimum Length of Line per 100 Gallons

Coverage Level (gpc)	Helitanker Tank Size				
	>1399	800-1399	600-799	400-599	200-399
	Feet of Line per 100 Gallons				
0.5	125	125	125	125	125
1.0	75	75	75	75	75
2.0	50	50	50	50	50
3.0	30	30	30	20	15
4.0	20	20	20	5	0
6.0	15	10	5	0	0
8.0	7	5	0	0	0

This performance shall be determined using a cup/grid system for determining pattern performance unless an accurate method of determining performance for the system exists based on the flow rate/performance information of a similar retardant delivery system.

The flow/performance of the retardant delivery system shall be reproducible for all drop types and the average flow rates for all releases of the same volume and flow control setting shall vary within a range (low to high measured value) which is not greater than 15 percent of the mean value flow rate for the drop type.

Procedure: Drop test the delivery system using a sampling grid to directly determine the ability of the helitanker to produce the required line lengths, or make the determination by comparing the flow measured during the static test with other flow/performance data from a similar retardant delivery system.

During static tests measure flow rates by monitoring floats which follow the top surface of the water when tank doors are opened. Monitor floats for all normal drop types. Calculate flow rates using computer programmed algorithm which combines float travel distance and time with tank geometry.

Replicate static tests will be used to establish that the performance at all drop types is reproducible. The average flow rates calculated from the static test data will also be compared within all drop types to ensure that they vary by no more than the allowable difference. The allowable difference is calculated as: 0.15 x (the mean value flow rate measured for the drop type).

3. Multiple Compartment Drops

a. Requirement: For drop combinations where two or more compartments are opened simultaneously, the rules as shown in figure 1 are followed unless the drop configuration results in a weight distribution which causes the c.g., to be outside the acceptable flight envelope. Any multiple compartment drop that results in a noncontiguous, non-rectangular configuration is considered unacceptable.

   Procedure: Check all compartment drop combinations visually during static test drops.

4. Venting

Discussion: The vent area controls the flow of air into the tank to replace the exiting retardant. Insufficient venting adversely affects the flow rate, it can cause "coke bottling" or hesitation in the flow resulting in thin spots in the ground pattern. The amount of venting required in order not to adversely affect flow depending on several factors including flow rate, tank head height and the amount of air space above the retardant at the start of the release.

a. Requirement: Vents are constructed so that no retardant leakage or slosh-over occurs.

Procedure: Make a visual check and measurements of vent construction, and check the height of the retardant in a tank filled to the IAB level for distance below vent outlets. If clearance or vent door construction is questionable, fly the helitanker when loaded at the maximum approved load and observe for slosh-over or leakage.

b. Requirement: The vent area for any compartment or tank is such that when the retardant is released from any compartment or combination of compartments, resulting negative pressures do not adversely affect the flow. The negative pressure shall be distributed so that flow is uniform throughout the compartment or tank. Any tank with static or in-flight negative pressures in excess of 0.25 psi must exhibit uninterrupted, reproducible and near linear flows.

Procedure: Check negative pressure with a pressure transducer during static test drops. If any section of a compartment or tank exhibits negative pressures greater than 0.25 psi, for any drop type, the examination of flow and other test data will be used to determine the presence or absence of uninterrupted, reproducible, and near linear flows.

5. Doors

Discussion: The door size, shape, and opening speed are all parameters which can influence the retardant flow rate and direction from a tank.

Many combinations of these parameters may provide acceptable flow rates as specified in paragraph C.2.b of this section. The most desirable combination, however, should minimize the fluid frontal area, not significantly deflect the fluid, while providing this flow rate. Thus a long, narrow tank is to be preferred over a square tank; fast opening doors are preferable unless opposed doors, flow straighteners, or some other means of preventing deflection are employed. Opposed doors may be mechanically linked to ensure equal opening angles.

a. Requirement: Any door or combination of doors shall not laterally deflect the flow of retardant from the tank.

(1) Unopposed doors without flow straighteners the door shall open within 10 degrees of vertical in 0.50 seconds or less.

(2) Unopposed doors using flow straightener devices the flow straighteners shall be configured in a manner to prevent lateral deflection to the exiting fluid during the main portion of the drop (after the first 10 percent and before the last 10 percent of volume is released).

(3) Opposed flow control doors the open angle for opposed doors shall differ by no more than 10 percent after the initial 10 percent of the load is released.

b. Requirement: Parallel doors, other than opposed doors used to control flow, shall be hinged on the outboard side away from the tank center line.

c. Requirement: When multiple doors are opened simultaneously, either as opposed doors to control flow or for multiple compartment drops, they shall begin to open within 0.50 seconds of each other.

Procedure: Door angle as a function of time is recorded by attaching a potentiometer to the tank coaxially with the door hinge. An arm attached to the potentiometer contacts the door during the drop. Video is also taken of the drop to record the door position and fluid motion of the retardant. The measured door opening times and video are also used as indicators in identifying problems in flow rate and sequencing. Deflection is examined from video taped static drops, video digitizing equipment may be used to measure the deflection angle.

6. Tank Drop Controllers

Discussion: The flexibility and accuracy inherent to retardant delivery systems meeting the flow rate/performance requirements is obtained operationally through the tank drop controllers. The controllers allow for selection of the parameters particular to the delivery system such as flow rate, drop type or volume, and time interval between releases (intervalometer) to produce continuous lines of retardant at the various coverage levels. Several factors influence what release information will produce the desired performance including airspeed, drop height, wind speed and direction, and G forces. In its simplest form the pilot takes these factors into account and sets the actual release information.

More complex drop controllers use computer look-up tables and algorithms to determine the release information from pilot inputs of coverage level and volume. In state-of-the-art controllers environmental and flight conditions, collected from on-board sensors and/or pilot input, are also evaluated in determining the best release.

a. Requirement: Each helitanker shall be equipped with a tank drop controller actuated by a positive returning primary drop switch providing door/volume selection options corresponding to the requirements in paragraph C.2.a of this section; and flow rate/coverage level selection options corresponding to the requirements in paragraph C.2.b of this section. The controller shall provide volume and flow rate accuracy and repeatability to within the limits specified in the requirements.

b. Requirement: An intervalometer is required in any tank drop control system with more than one compartment. The intervalometer shall permit selection of time intervals for the automatic sequence of compartment releases at 0.1 second intervals over a time range longer than the time required to empty all compartments at all volume and flow rate settings. The accuracy and repeatability of the intervalometer shall be plus or minus 0.05 seconds at any setting.

c. Requirement: A drop control selector with continuous automatic repeating of the programmed release information (flow rate/coverage level, door number combination/volume, and if applicable time interval) as long as the drop switch is held in the actuated position is required. If the primary drop switch is released during the automatic timed sequence of releases, the controller shall stop the drop at or before the next volume increment is released.

d. Requirement: Arming switch or switches are required to prevent release of door by inadvertent actuation of the primary drop switch.

e. Requirement: Indicator (s) and/or annunciator panel positioned within clear view of the pilot and co-pilot to indicate those compartments that are armed and whether or not they have been released or the volume remaining in tank/compartment in systems capable of making other than full tank/compartment releases. The indicators shall show the flow rate/coverage level setting, drop type/

volume setting, and if applicable time interval between releases. The indicators shall also indicate any open doors.

f. Requirement: The information programmed into the microprocessor controllers must be accurate and the latest available.

Procedures: Demonstrate that the tank controller has the appropriate settings and indicators. Accurately measure intervalometer timing, accuracy and repeatability with an electronic test instrument connected in parallel with the door opening solenoids. Flow rate data collected under paragraph C.2 in this section will be used to determine accuracy and repeatability of flow rate settings. Programmed data will be submitted to the testing and evaluation team, if acceptable the programmed data will be verified during static testing.

7. Tank Fill-Gauge

a. Requirement: A positive level gauge or indicator is provided that shows when each compartment is filled to the certified load limit, or when each compartment is at predetermined partial load points if reduced loads are used. A gauge or indicator is readily visible to the loading crew at the loading points and flight crew from normal operating stations and the tank capacity of each loading level clearly marked.

Procedure: Check fill level gauge by metering accurate volume of water while the helitanker is in its normal filling attitude. Visually evaluate permanent markers placed to indicate the certified load limit levels.

8. Self-Filling Capability

a. A suppressant delivery tank with self-contained hover drafting system. As a minimum, each system shall meet the following requirements:

(1) Fill time less than 90 seconds

(2) Built to Aviation Industry Standards

(3) Shall not adversely affect any aircraft system

(4) Capacity commensurate with the maximum rated lifting capability of the helicopter equipped with the tank and drafting system at sea level on a standard day. Further, the weight of the tank and drafting system shall not exceed 12.5 percent of the weight of the water in the tank when it is filled to full capacity.

(5) System will be equipped with an overfill limiting device.

Procedure: Check full tank capacity fill time. Ensure appropriate certifications and approvals. Compute weight of tank and drafting system to ensure weight compliance. Ensure overfill limiting device works properly.

9. Safety Valve or Device

a. Requirement: A safety valve or device to prevent over-pressurizing of the delivery system.

Procedure: Check safety valve or device to ensure over-pressurization does not occur.

10. Suppressant/Retardant Mixing Equipment

a. Requirement: On-board equipment to store, inject, and mix fire suppressant/retardant materials in the delivery system while in flight. The system shall only require the pilot to select a mix ratio and to start the mix sequence, all other functions shall be automatic. Mixed ratios will vary from one-tenth of one percent to one percent.

Procedure: Check installation and capabilities of system to mix appropriate ratios during flight.

**** RESERVED ****

SECTION VI

F O R M S

NATIONAL INTERAGENCY AIRTANKER BOARD
HELITANKER CONFORMITY INSPECTION

1. Company Name: ____

   Street Address: ____

   City: _________________________________ State: _______________________ Zip: ___________________

2. Type of Aircraft: ____

   "N" No.:____

   S/N:____

   A. Tank No.:____

      Internal tank capacity: ____

      External tank capacity (including buckets):____

   B. Total tank capacity _______________________gallons. No. of doors: _________________

   C. Tank and systems in conformance with TC or STC No.: ______________________________

   D. Flight manual supplement outlining limitation: Yes _________ No ___________

3. Weight and Balance Information

   A. Date aircraft weighed with tank installed: _______________________________

   B. Empty weight computed to include tank? Yes ___________ No ___________

   C. Balance computed and within limits with empty tank? Yes _______ No _________

   D. Balance computed and within limits with full tank? Yes ______ No ________

   E. Gross weight allowable for takeoff (sea level; standard day) _________________ lb

   F. Empty weight (including empty tank) ______________ lb

   G. Useful load ______________ lb

   H. Crew, equipment carried on fire missions _______________ lb

   I. Weight of fuel for 1-1/2 hr mission _______________ lb

   J. Retardant load allowable _______________ lb

   K. Normal operating weight with 1-1/2 hr of fuel _______________ lb

4. Retardant tank

   A. Does tank leak when filled with water? (Maximum leakage one-half gal/24 hr) Yes ______ No ________

   B. Is the emergency system independently controlled and operated, enabling the entire load to be dropped in less than six (6) seconds? Yes ______ No ________

   C. The emergency system is operated by (check one):

      Mechanical______________ Pneumatic_______________ Fluid Pressure________

   D. Is the primary dump control position within easy reach of all required flight crewmembers?

      Yes______ No________

(If electrically operated, is the control wired direct to a source of power such as the normal aircraft electrical bus, and protected by a fuse or circuit breaker of adequate capacity? Yes ________ No ___________

E. Pneumatic systems. Is a means available to check system pressure on preflight prior to any mission?
Yes ________ No __________

F. Do all tanks of 400 gallons or more have the capability of being offloaded to no more than 7 percent of the total certified load capacity? Yes _______ No _______

G. Are all tank doors closable in flight? Yes _________ No __________
(If not, can helicopter land without damage to open doors?) Yes ______ No __________

H. Are all tanks capable of being filled through 3-inch single or dual Kamlock fittings on both sides of the helicopter? Yes _________ No _________
(Are sufficient cross flows provided so that the retardant will be level in all compartments within 30 seconds after the pump is stopped, and that no compartment will fill and overflow during the fill cycle, prior to reaching certified volume)? Yes _________ No __________

I. Compartments sequenced individually in normal drop configuration are constructed so as to eliminate leakage from one compartment to the other when one has been evacuated? Yes _________ No __________

J. Are door openings accomplished through primary switches or mechanism located on the cyclic or collective stick? Yes __________ No __________

K. The intervalometer, if required, provides accurate sequencing of door at intervals continuously variable (accuracy within ±0.1 sec)? Yes _______ No _______

L. A positive level gauge or indicator is provided to show when each compartment is at certified load limit and/or partial load limit if required? Yes ______No ______
(Gauge or indicator is located readily visible to the loading crew at the loading port)? Yes ______ No _____

M. Retardant Tank Operation

1. Has tank static test and/or pattern evaluation been completed, and all discrepancies been corrected?
Yes ________ No _________

2. Test details:

Location: ____Date of inspection: ___________________

Testing authority: ____

5. Inspection Details and Results

Location: ____

Date of inspection: ____

Aircraft is: Approved ______________ Rejected _____________

BOARD TEAM MEMBERS

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All "Yes" or "No" answered questions must have "Yes" answers for Board approval of Step No 4.

REMARKS/DISCREPANCIES

INTERAGENCY AIRTANKER BOARD
AIRTANKER PROBATIONARY EVALUATION

Instructions: The Interagency Airtanker Board requests that you complete this evaluation form after carefully weighing observed operational characteristics. This information will be utilized for final Board acceptance or rejection of the airtanker as a permanently qualified addition to the airtanker fleet.

This evaluation should be as objective as possible, realizing that the aircraft may be flown by many pilots over its lifetime of service. To the extent possible, base your answers on aircraft capabilities rather than pilot skills.

When complete, please send through channels to Chairman, Interagency Airtanker Board.

Aircraft type:____

Manufacturer's Serial No.:____

"N" No.:____

A/T No.:____

Assigned Base:____

Use following code for Sections 1 through 3:

A	=	Average
AA	=	Above average
BA	=	Below average
UA	=	Unacceptable

1. Base Manager Evaluation

A. Getaway time____

B. Ground handling characteristics_______________________________________

C. Maintenance reliability (excluding tank system)___________________________

D. Tank system reliability____

(1) System breakdowns ____

(2) Leakage ____

2. Lead Plane—Air Attack Boss—Air Co—Evaluation

A. Observed maneuvering capability ___________________________________

B. Ability to approach steep targets ___________________________________

C. Tank system flexibility on different fuel types and at varying altitudes ___________________________

3. Ground Observer(s) — Evaluation

A. Drop pattern characteristics on:

1. Light fuels: ____

2. Intermediate fuels: ____

3. Heavy fuels: ____

4. Uniformity of coverage: ____

4. General Comments:

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Evaluator: ____ **Date:** ______________________

Title and Administrative Organization: ____

INTERAGENCY AIRTANKER BOARD
CHANGE PROPOSAL

This form is provided to allow for the submission of proposed changes to the IAB Charter, Criteria, and Forms document. Please provide all the information identified below to assure understanding of your change. Additionally, provide the exact wording of the change you would like to propose. When complete, send this form to the IAB chairman.

Your Name: ____

Your Affiliation/Company: ____

Your Address: ____

____

Your Phone Number: ____

Your FAX Number: ____

Your Internet Address: ____

Existing portion or section you are proposing be changed:

Page No. _________ **Paragraph No.** ______________ **Existing Text** (If appropriate photo copy and paste here)

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Proposed Change:

Reason for Change (Please be explicit):

NATIONAL INTERAGENCY AIRTANKER BOARD
AIRTANKER COMFORMITY INSPECTION

1. Company name: ____________________
   Street address: ____________________
   City: ____________________ State: __________ Zip: __________

2. Type of aircraft: ____________________
   "N" number: ____________________
   S/N (per A/W Certificate): ____________________
   A. Tanker number: ____________________
   B. Tank capacity: ____________________ Gallons Number of doors: __________
   C. Tank and systems in conformance with TC or STC number: ____________________
   D. Flight manual supplement outlining limitations: Yes __________ No __________

3. Aircraft weight information (pounds)
   A. Maximum retardant load at Zero Fuel Weight (ZFW)
      1. Empty weight ____________________
      2. Minimum required crew & flight kit ____________________
      3. Fluids per Section III A.2., excluding fuel ____________________
      4. Total (lines 1, 2, 3) ____________________ (Basic Operating Weight)
      5. Zero Fuel Weight ____________________ (ZFW)
      6. Maximum retardant load (line 5 minus 4) ____________________

   B. Normal Operating Weight Computations
      1. BOW (Basic Operating Weight) (Line 3.A.4)
      2. Fuel (2-1/2 hours @ 55% power per Section III, A.2.) ____________________
      3. Retardant load ____________________
      4. Operating fluids (Not included in BOW) ____________________
      5. Other loads carried (spares, baggage, etc.) ____________________
      6. Total (lines 1, 2, 3, 4, 5) ____________________

   C. Gross Weight Check
      1. Max Takeoff Gross Weight ____________________
      2. Normal Operating Weight (Line 3.B.6) ____________________
      3. Difference (Line 1 minus 2) ____________________

NOTE: If 3.C.3 is a Negative Value, Complete D Below for Retardant Load Adjustment.

D. Adjusted Retardant Load Calculation

1. Maximum retardant load (line 3.A.6) ______________________________________
2. Retardant load correction (line 3.C.3) _____________________________________
3. Corrected maximum allowable retardant load (line 1 minus 2) ________________

4. Retardant Tank

A. Tank does not leak when filled with water (Max leakage 1/2 gallon/24 hours).

Yes ________________ No ________________

B. Was tank loaded to certified amount, using approved meter or weighting system?

Yes ________________ No ________________

C. Is the Emergency System independently controlled and operated, enabling the entire load to be dropped in less than six (6) seconds? Yes ________________ No ________________

D. The Emergency System is operated by (Check One): Mechanical _________

Pneumatic __________

Fluid Pressure_______

E. Is the primary dump control positioned within easy reach of all required flight crewmembers?

Yes ________________ No ________________

1. If electrically operated, is the control wired directly to a source of power other than the normal aircraft electrical bus, and protected by a fuse or circuit breaker of adequate capacity?

Yes ________________ No ________________

F. Pneumatic System

1. Is a means available to check emergency system pressure on preflight prior to any mission?

Yes ________________ No _______________

2. Is emergency system pressure isolated from the normal system?

Yes ________________ No ________________

G. Fluid Pressure System

1. Is an emergency system pressure gauge readily visible to all required crew members while seated in their in-flight positions? Yes ________________ No ________________

2. Is emergency dump system pressure isolated from normal system pressure? (Normal function or failure shall not affect emergency system pressure.) Yes ________________ No ________________

H. Do all tanks have the capability of being off-loaded through a standard 3 inch Kamlock or equal coupler to no more than 7% of the total certified load capacity? Yes ________________ No _______________

I. Are all tank doors capable of being closed in flight? Yes ________________ No _______________

J. Are all tanks capable of being filled through a 3 inch single or dual Kamlock fitting on either side of the aircraft or tail at an average fill rate of no less than 500 gallons/minute?

Yes ________________ No _______________

1. Are sufficient cross flows provided so that the retardant will be level in all compartments within 30 seconds after the pump is stopped, and that no compartment will fill and overflow during the fill cycle, prior to reaching certified volume? Yes ________________ No ________________

K. Compartments sequenced individually in normal drop configuration are constructed so as to eliminate leakage form one compartment to the other when one has been evacuated?

Yes ______________ No ___________________

L. Are door openings accomplished through primary switches or mechanisms located on the control yoke or throttle/trim quadrant? Yes ________________ No ________________

M. The intervelometer provides accurate sequencing of doors at intervals continuously variable (accuracy within plus or minus 0.05 seconds)? Yes ________________ No ________________

N. A positive level gauge or indicator is provided to show when each compartment is at certified load limit and/or partial load limit if required? Yes ________________ No ________________

1. Gauge or indicator is located readily visible to the loading crew at the loading port?

Yes ________________ No ________________

O. Retardant Tank Operation

1. Has tank static test and/or pattern evaluation been completed, and all discrepancies been corrected?

Yes ________________ No ________________

2. Test Details:

Locations:____ Date of Test Completion: __________________

Testing Authority: ____

5. Inspection Details and Results

Locations:____

Date of Inspection: ____

Aircraft is: Approved _______________________ Rejected ____________________________

Board Team Members:____

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All "Yes" or "No" questions above must be answered "Yes" for Board approval of Step No. 4.

REMARKS/DISCREPANCIES

SECTION VII

ACRONYMS, ABBREVIATIONS, DEFINITIONS, AND NOTES

SECTION VII

ACRONYMS, ABBREVIATIONS, DEFINITIONS, AND NOTES

ACRONYMS AND ABBREVIATIONS

F: Fahrenheit temperature scale

fpm: feet per minute

ft: feet

gpc: gallons per 100 square feet

gpm: gallons per minute

ISA: International Standard Atmosphere

METO: Maximum Power Except Take-Off

DEFINITIONS

Conventional Tank: A conventional tank is one in which the total retardant load is divided into multiple isolated compartments. The release system is designed to sequence the doors of these compartments (with or without flow restrictors) over an interval of time which results in the building of a retardant line.

Coverage Level: The amount of retardant covering the ground or foliage expressed in gallons per 100 square feet.

Drop: The release of retardant from the aircraft retardant system.

Drop Controller: A device installed in an airtanker that allows the pilot to select and release retardant based on desired flow rate. The drop controller controls volume released, flow rate and drop sequence.

Drop Test: A dynamic flying test of the aircraft retardant delivery system over a cup/grid matrix which is used to determine the coverage level production of the system for each drop type.

Drop Type: The characteristics of a release from an airtanker. Characteristics should include volume and/or number of tanks, flow rate, interval between releases etc., applicable to the system. For example, a conventional system with 6 equal tanks 2 flow rates and 2400 gallons total capacity releasing 3 compartments sequentially at 0.30 second intervals could be described as a 3 door 0.30 seconds low flow trail (1200 gallons). Similarly, a constant flow system of 2000 gallons capacity releasing 1000 gallons at flow rate 2, could be described as 1/2 load (1000 gal.) FR 2.

Intervalometer: A device installed in an aircraft which controls the open and close sequencing and time interval of the doors on a multiple compartment retardant tank (i.e. conventional tank).

Non-conventional Tank: A retardant tank which is other than a conventional tank and includes constant flow type tanks. Constant flow tanks utilize modulation of the doors on typically a single tank to control the drop.

Proponent: The person or entity seeking approval of an airtanker.

Release: The dropping or discharge of retardant from a tank or compartment of a retardant system.

Static Test: A test of the aircraft retardant system while on the ground at a flight attitude. The test is used to determine the characteristics and performance of the system. Static tests may include measurements of flow rate, flow characteristics, internal tank pressure, door opening, volume released, etc.

NOTES

1. Examples of flow rate requirement:

   S2F - 800 gallons
   The 800-gallon volume requires at least 2 releases (load to be split).

   a. If 2 - 400 gallon compartments were used, each compartment would have to produce 3 flow rates; 1, 3, & 4.

   b. If 4 - 200 gallon compartments were used, each compartment would have to produce 2 flow rates; 2 & 4.

   c. Current CDF S2F's would require a restrictor in each tank that could produce a restricted flow rate 2 in addition to the unrestricted flow rate 4.

   DC-4 - 2,000 gallons
   The 2,000 gallon volume would require at least 4 releases (load to be divided into 4 equal drops).

   a. If 4 - 500 gallon compartments were used, each compartment would have to produce 2 flow rates; 1 & 4.

   b. If 6 - 335 gallon compartments were used, each compartment would have to produce 2 flow rates; 1 & 3 or 4.

   c. If 8 - 250 gallon compartments were used, each compartment would have to produce 2 flow rates; 2 & 3 or 4.

   DC-6/7 - 3,000 gallons
   Would require at least 6 releases (1/6 of the load).

   a. If 6 - 500 gallon compartments were used, each compartment would have to produce 2 flow rates; 1 & 3 or 4.

   b. If 8 - 375 gallon compartments were used, each compartment would have to produce 2 flow rates; 1 & 3 or 4.

   c. If 12 - 250 gallon compartments were used, each compartment would have to produce 2 flow rates; 2 & 3 or 4.

2. Equal Drop Volume

   Repeatability of the tanking system to achieve designated coverage levels is an important aspect. When tanking systems are divided into compartments (i.e. conventional tanks), equal volumes dropped from each compartment cannot be assumed. In fact and in practice, current systems do not achieve equal volumes dropped for a given coverage level. In operational use this may create thin coverage, or a skip in the retardant line. Hence, it is required that the tank system be designed such that equal volumes are released for each drop type or coverage level the system is designed to achieve. To be considered equal within the test series, the volumes dropped must not vary more than 12 percent of the average volume measured in the series.

Example:

Consider a tank with 1600 gallon capacity. The compartments are designed to be 400 gallons each. The following are measured for a given drop type.

Aircraft loaded with 1605 gallons.

Doors sequence individually.

Door	Volume Measured
1	360
2	402
3	398
4	397

Average measured value = (360 + 402 + 398 + 397) / 4 = 389 gallons

Low Measurement = 360
High Measurement = 402

Difference = 402 - 360 = 42

12 percent of the average measured value = 389 * 0.12 = 46.7

Since 42 is less than the allowed range of 46.7, the tanker would have passed this portion of the static testing.

One should note that this method does not require that the 12 percent range be centered around the average or mean value of the measured volumes dropped. The range is allowed to slide to the maximum extent possible to achieve the test data, but does not extend beyond 12 percent of the average value. The following may help explain this difference.

Using the above example, the average measured value is 389. If the range were restricted to be centered around this number, the requirement would be “the average value +/- 6 percent.” This would achieve a 12 percent range, but it is more stringent than the IAB requirement; and the results would be as follows:

Low allowed value = 389 * (1.00 - 0.06) = 365.6
High allowed value = 389 * (1.00 + 0.06) = 412.3

In this case, the airtanker would fail since 360 is lower than the allowed value of 365.6.

SECTION VIII

AIRTANKER LISTING

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
00	Aero Union Corp.	P-3A	900AU	151391	SA4861NM	A	27,000	3,000	Y	3/97	RADS II
01	Aero Union Corp.	SP-2H	701AU	145920	A24NM	A	18,000	2,000	Y	1/91	AU Tank-Controller
02	Aero Union Corp.	C-54A	11712	41-37297	SA3165WE						Not Tanked
03	Aero Union Corp.	SP-2H	703AU	147967	A24NM	A*	18,000	2,000	Y	9/87	AU Tank-Controller
04	Neptune, Inc.										Unassigned
05	Neptune, Inc.	P2V-5	96278	131459	SA2926SW	A	24,300	2,700	Y	4/97	BH Tank (A17EA)
06	Neptune, Inc.	P2V-5	9855F	131445	SA2926SW	A	24,300	2,700	Y	3/91	BH Tank
07	Neptune, Inc.	P2V-5	1386K	131424	SA2926SW	A	24,300	2,700	Y	2/96	95 FS reserve T&R
08	Neptune, Inc.	P2V-7	14835	148358		A	24,300	2,700	Y	6/94	Step 5 Procedure A
09	Neptune, Inc.	P2V-7	4235T	150282	A15SW	A	24,300	2,700	Y	4/97	BH Tank
10	Neptune, Inc.	P2V-7		144681	A15SW	A	24,300	2,700	Y	5/91	BH Tank
11	Neptune, Inc.	P2V-7	14447	8010	A15SW	A	24,300	2,700	Y	3/97	BH Tank
12	Neptune, Inc.	P2V-7	96264	128346	A17EA	A	24,300	2,700	Y	1/91	BH Tank
13	Aero Union Corp.	C-54D	62342	42-72508							Not Tanked
14	Aero Union Corp.	C-54E	62297	27328	337/SA3165WE	A	18,000	2,000	N	5/91	AU Tank (A-762)
15	Aero Union Corp.	C-54G	2742G	36089	337/SA3165WE	A	19,800	2,200	N	3/97	AU Tank
16	Aero Union Corp.	SP2H	716AU	140963	A24NM	A*	18,000	2,000	Y	4/91	AU Tank Controller

AIRTANKER LISTING

Revision Date 1/1/98

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
17	Aero Union Corp.										Unassigned
18	Aero Union Corp.	SP2H	718A	147964	A24NM	A	18,000	2,000	Y	4/91	AU Tank
19	Aero Union Corp.										
20	Aero Union Corp.	P-3A		151355	SA4861NM						Not Tanked
21	Aero Union Corp.	P-3A		151385	SA4861NM	A				4/97	Constant Flow
22	Aero Union Corp.	P-3A	922AU	151387	SA4861NM	A	27,000	3,000	Y	4/97	Constant Flow Tank
23	Aero Union Corp.	P-3A	923AU	151372	SA4861NM	A	27,000	3,000	Y	5/97	AU Tank
24	Aero Union Corp.	P-3A		151377	SA4861NM						Not Tanked
25	Aero Union Corp.	P-3A	925AU	151361	SA4861NM	A	27,000	3,000	Y	3/97	AU Tank (A32NM)
26	Aero Union Corp.	P-3A	76AU	152731	SA3165WE						RADS II
27	Aero Union Corp.	P-3A	927AU	151369	SA4861NM	A	27,000	3,000	Y	4/91 Due	AU Tank (A32NM)
28	Internat'l Air Response										
29	Internat'l Air Response	DC-7B	45353	45353		N					Not Tanked
30	Internat'l Air Response	C-130A	116TG	54-0478	SA485ONM	A*	27,000	3,000	Y	Due	AU Tank (RADS)

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
31	Internat'l Air Response	C-130	117TG	54-1631	SA485ONM	A*	27,000	3,000	Y		AU Tank (RADS)
32	Internat'l Air Response	C-130	N118TG		STC		27,000	4,500			Step 1 Procedure A T&G/Marsh
33	Internat'l Air Response	DC-7B	4887C	45351	337/SA2709-WE	A	27,000	3,000	Y	8/92 Due 98	AU Tank
34	Internat'l Air Response										Unassigned
35	Internat'l Air Response										Unassigned
36	Hirth Air Tankers	PV-2	7670C	37472							
37	Hirth Air Tankers	PV-2	7458C	151200		N			N		Step 1 Procedure A
38	Hirth Air Tankers	PV-2	6856C	151156		I	9,450	1,050	N	Due	Step 1 Procedure C
39	Hirth Air Tankers	PV-2	7080C	151465		I	10,800	1,200	N	Due	Step 1 Procedure C
40	Hirth Air Tankers	PV-2	7272C	37276							
41	Erickson Air Crane	S64				A*	18,000	2,000	N		Step 5 Procedure A
42	Erickson Air Crane	S64				A	18,000	2,000	Y	10/93	
43	Erickson Air Crane	S64				A*	18,000	2,000	N		Step 5

AIRTANKER LISTING

Revision Date 1/1/98

No.	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
44	Erickson Air Crane	S64				A*	18,000	2,000	N		Step 5
45	Erickson Air Crane	S64				A*	18,000	2,000	N		Step 5
46	Erickson Air Crane	S64				A*	18,000	2,000	N		Step 5
47	Erickson Air Crane	S64				A*	18,000	2,000	N		Tanker Complete Needs Conformity
48	Erickson Air Crane	S64				A*	18,000	2,000	N		Tanker Complete Needs Conformity
49	SLAFCO Inc.	S-PBY	2886D	64034	CAA Part 8	I	13,500	1,500	N	Due	Step 1 Procedure C SLAFCO Tank
50	Minden Air Corp.										Unassigned
51	Minden Air Corp.										Unassigned
52	Aero Retardant Inc										Unassigned
53	SLAFCO Inc.	S-PBY	9505C	34027	CAA Part 8	I	13,500	1,725	N		Step 1 Procedure C
54	Minden Air Corp.										Unassigned
55	Minden Air Inc.	P2V-7	355MA	148344	TC#A36NM		24,300	2,700			
56	Minden Air Inc.										Unassigned
57	TBM Inc.										Unassigned
58	TBM Inc.										Unassigned

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
59	TBM Inc.										Unassigned
60	TBM Inc.	DC-7B	838D	45347	337/SA2709WE	A	27,000	3,000	Y	93	AU Tank (1)
61	TBM Inc.										Unassigned
62	TBM Inc.	DC-7	401US	45145	337/SA2709WE	A	27,000	3,000	Y	4/97	AU Tank (1) Review conformity
63	TBM Inc.	C-130A	473TM	56-473	SA4850M	A*	27,000	3,000	Y	2/96	AU Tank
64	TBM Inc.	C-130A	466TM	57-466	SA485OM	A*	27,000	3,000	Y	5/96	AU Tank (A15NM)
65	TBM Inc.	C-54E	8502R	44-9141	337/SA3603WE	A*	18,000	2,000	N	3/93	Waig Tank (A762) (1) Hydraulics
66	TBM Inc.	DC-7	6353C	45486	337/SA2709WE	A	27,000	3,000	Y	1/97	AU Tank (1) Review conformity
67	TBM Inc.	C-130A	531BA	56-531	SA4850M	A*	27,000	3,000	Y	4/91	AU Tank
68	TBM Inc.	DC-6	90739	43044	337/SA3151WE	A*	22,050	2,450	N	4/91 Due	AU Tank (1) Review conformity
69	TBM Inc.										Unassigned
70	CDF	S2	442DF	255	A25WE	N	7,200	800	N		AU Tank
71	CDF	S2	443DF	195	A25WE	N	7,200	800	N		AU Tank
72	CDF	S2	405DF	266	A25WE	N	7,200	800	N		AU Tank
73	CDF	S2	406DF	293	A25WE	N	7,200	800	N		AU Tank

AIRTANKER LISTING

Revision Date 1/1/98

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
74	CDF	S2	411DF	476	A25WE	N	7,200	800	N		AU Tank
75	CDF	S2	420DF	388	A25WE	N	7,200	800	N		AU Tank
76	CDF	S2	417DF	061	A25WE	N	7,200	800	N		AU Tank
77	CDF	S2	423DF	246	A25WE	N	7,200	800	N		AU Tank
78	CDF	S2	412DF	222	A25WE	N	7,200	800	N		AU Tank
79	CDF										Unassigned
80	CDF	S2	404DF	455	A25WE	N	7,200	800	N		AU Tank
81	TBD	C-130A	131FF	56-0530	SA4557NM	A	27,000	3,000	Y	5/91 Due	HV Tank (A31NM)
82	Hemet Valley Flying Service										Unassigned
83	TBD	C-130A	N132FF	56-511	SA4835	A	27,000	3,000	Y	5/95	HV Tank (A31NM)
84	Hemet Valley Flying Service										Unassigned
85	Flying Firemen	S-PBY	85U	64041		N	13,500	1,500	N		
86	Hemet Valley Flying Service										Unassigned
87	Hemet Valley Flying Service										Unassigned
88	TBD	C-130A	138FF	57-520	SA4835NM	A	27,000	3,000	Y	5/91 Due	HV Tank (A31NM)

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
89	TBM Inc.										Unassigned
90	CDF	S2	450D	421	A25WE	N	7,200	800	N		AU Tank
91	CDF	S2	453DF	572	A25WE	N	7,200	800	N		AU Tank
92	CDF										
93	CDF	S2	447DF	417	A25WE	N	7,200	800	N		AU Tank
94	CDF	S2	446DF	175	A25WE	N	7,200	800	N		AU Tank
95	CDF	S2	448DF	684	A25WE	N	7,200	800	N		AU Tank
96	CDF	S2	416DF	613	A25WE	N	7,200	800	N		AU Tank
97	Hawkins & Powers Aviation	KC-97	1365N	52-2698	A7NW	A	36,000	4,000	Y	3/94	HV Tank
98	SLAFCO	S-PBY	31235	48426	CAA Part 8	N	13,500	1,725	I		Step 1, Procedure C SLACFO Tank
99	Minden Air Corp.	P2V-7	299MA	147961	A26NM	A	24,300	2,700	Y	4/95	
100	CDF	S2	436DF	455	A25WE	N	7,200	800	N		AU Tank
101											Unassigned
102	Central Air Service	C-54E	816D	44-9150	337/SA1721CE	N	18,000	2,000	N		CAS Tank (A-762)
103	Central Air Service										Unassigned
104	Central Air Service										Unassigned

AIRTANKER LISTING

No Unassigned	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
105	Central Air Service	C-54D	96454	42-72759	SA1721CE	N	18,000	2,000	N		CAS Tank (A-762)
106	Central Air Service										Unassigned
107	Central Air Service										Unassigned
108	Central Air Service										Unassigned
109	Central Air Service	C-54D	6816D	44-9142	SA1721CE	N	18,000	2,000	N		CAS Tank (A-762)
110											Unassigned
111	Central Air Service	C-54E	96541	56489	SA1621SE S	N	18,000	2,000	N		CAS Tank (A-762)
112	Neptune	P2V									Unassigned
113	Neptune	P2V									Unassigned
114	TBM Inc.										Unassigned
115	Airborne	PBY	322FA	560	AI-101	I					Step 1 Procedure A
116											
117	Central Air Service	DC-4	31356	42914	337/SA1741CE	N	18,000	2,000	N		CAS Tank (A-762)
118	ARDCO										Unassigned
119	ARDCO	C-54G	406WA	35944	SA3603WE	A*	19,800	2,200	Y	3/97	WA Tank (A-762)
120	Hawkins & Powers Aviation										Unassigned
121	Hawkins & Powers Aviation	S-P4Y-2	2871G	66302	CAA Part 8	A	19,800	2,200	Y	3/97	H&P Tank (AR-29) (2)

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
122	Hawkins & Powers Aviation										Unassigned
123	Hawkins & Powers Aviation	S-P4Y-2	7620C	66260	CAA Part 8	A	19,800	2,200	Y	2/95	H&P Tank (AR-29) (2)
124	Hawkins & Powers Aviation	S-P4Y-2	2872G	66300	CAA Part 8	A	19,800	2,200	Y	5/93	H&P Tank (AR-29) (2)
125	Hawkins & Powers Aviation										Unassigned
126	Hawkins & Powers Aviation	S-P4Y-2	7962C	59882	CAA Part 8	A	19,800	2,200	Y	5/93	H&P Tank (AR-20) (2)
127	Hawkins & Powers Aviation	S-P4Y-2	6884C	59701	CAA Part 8	A	19,800	2,200	Y	3/93	H&P Tank (AR-29) (2)
128	Hawkins & Powers Aviation										Unassigned
129	Hawkins & Powers Aviation										Unassigned
130	Hawkins & Powers Aviation	C-130A	130HP	56-538	A31NM	A	27,000	3,000	Y	4/93	HV Tank SA4835NM
131	Hawkins & Powers Aviation	C-130A	131HP	56-534	A31NM	A	27,000	3,000	Y	6/97	HV Tank SA4835NM
132	Hawkins & Powers Aviation										Unassigned
133	Hawkins & Powers Aviation	C-130A	133HP	57-482	A31NM	A	27,000	3,000	Y	4/97	HV Tank to SA4835NM

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
134	Hawkins & Powers Aviation	C-130A									
135	Hawkins & Powers Aviation										Unassigned
136	Hawkins & Powers Aviation										Unassigned
137	Hawkins & Powers Aviation										Unassigned
138	Hawkins & Powers Aviation	P2T	138HP								Under Production
139	Hawkins & Powers Aviation	P2V-7	139HP	145906	A34NM	A	22,050	2,450	Y	1/97	BH Tank
140	Hawkins & Powers Aviation	P2V-7	140HP	140443	A34NM	A	22,050	2,450	Y	5/97	BH Tank
141	Evergreen Helicopters	P2V-5	202EV	131502	ST163RM	N	22,050	2,450	Y		EV Tank (A17EA)
142	Evergreen Helicopters	P2V-5	203EV	128382	337/ST163RM	N	22,050	2,450	Y		EV Tank (A17EA)
143	Evergreen Helicopters	P2V-5	204EV	128378							Not Tanked
144	Evergreen Helicopters	P2V-5	205EV								Not Tanked
145	Evergreen Helicopters	P2V-5	206EV	131482	337/ST163RM	N	22,050	2,450	N		EV Tank (A17EA)

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
146	Central Air Service	C-54E	67061	50875	337/ST1741CE	N	18,000	2,000	N		CAS Tank (A-762)
147	Central Air Service	C-54D	67040	27232	337/SA1741CE	N	18,000	2,000	N		CAS Tank (A-762)
148	Central Air Service	C-54E	67062	56548	SA1404CE	N	18,000	2,000	N		CAS Tank (A-762)
149	Central Air Service	C-54D	67041	56505		N					Not Tanked
150	Central Air Service	C-54D	67034	56548	SA1587CE	N	18,000	2,000	N		CAS Tank (A-762)
151	ARDCO	C-54E	460WA	44-9133	337/SA3603WE	A*	18,000	2,000	Y	6/97	WA Tank (A-762)
152	ARDCO	C-54D	9015Q	43-17228	337/SA3603WE	A*	18,000	2,000	Y	?/97	WA Tank (A-762)
153	ARDCO										Unassigned
154	Marsh Av.	S2-A	736MA	136736		N		800			Step 1, Procedure A
155	Marsh Av.	S2-T	746MA	136746	SA4837NM	N		1100			Step 1, Procedure A
156	Marsh Av.										Unassigned
157	Marsh Av.										Unassigned
158	SLAFCO	PBY	9825Z	235	CAA Part 8	I	9,500	1,056	N		Step 1 Procedure C SLAFCO Tank
159											Unassigned
160	Aero Flite	C54E	96358	44-9058	337/SA3603WE	A*	18,000	2,000	Y	1/97	WA Tank (A-762)
161	Aero Flite	C-54G	82FA	35960	SA3603WE	A*	18,000	2,000	Y	4/97	WA Tank (A-762)
162	TBM Inc.										Unassigned

AIRTANKER LISTING

Revision Date 1/1/98

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
163											Unassigned
164											Unassigned
165	TBM Inc.										Unassigned
166	Hemet Valley Flying Service	C-54G	90203	45-0481	337/SA3603WE	N	19,800	2,200	N		WA Tank (A-762)
167	ARDCO										
168	ARDCO										Unassigned
169	ARDCO										Unassigned
170	ARDCO										Unassigned
171	ARDCO										Unassigned
172	ARDCO										Unassigned
173	ARDCO										Unassigned
174	ARDCO										Unassigned
175	ARDCO										Unassigned
176	ARDCO										Unassigned
177	ARDCO										Unassigned
178	ARDCO										Unassigned
179	ARDCO										Unassigned

AIRTANKER LISTING

No	Owner/Operator	Aircraft Type	"N" No.	Aircraft Serial No.	Approval Basis	Status Code	Payload	Max. Vol.	ST	Con. Done	Remarks
180	CDF										
181	Queen Bee	AT-802F	5035K	48			800	800			
182	Queen Bee	AT-802A	91092	5		A	800	800	Y	3/96	
183	Queen Bee										
184	Queen Bee										
185	Queen Bee										
186	Queen Bee										
187	Queen Bee										
188	Queen Bee										
189	Queen Bee										
190	Heavilift Inc Helicopters		64KL								Needs Conformity
191	Heavilift Inc Helicopters										Unassigned
192	Heavilift Inc Helicopters										Unassigned
193	Heavilift Inc Helicopters										Unassigned
194	Heavilift Inc Helicopters		44094						Y		Unassigned

COLUMN ABBREVIATIONS:

ST—Static Test
CON DONE—Date of last IATB conformity inspection

NOTES:

(1) STC NO. 3051WE applies to eyebrow windows
(2) STC NO. SA1900WE applies to H&P P4Y-2 installation of R-2600 engines
(3) STC NO. SA3149NM applies to electronic sequencer for retardant tank control

AIRTANKER STATUS CODE:

A	Approved airtanker
N	Not an approved airtanker
I	Interim approved airtanker
A*	Approved with time limit

REMARKS ABBREVIATIONS:

AT Tank	Air Tractor Tank
AU TANK	Aero Union Tank
BH TANK	Black Hills Tank
CAS TANK	Central Air Service Tank
EV	Evergreen Helicopters Tank
H&P	Hawkins & Powers Aviation Tank
MA TANK	Minden Air Tank
HV TANK	Hemet Air Tank
R/BH TANK	Rosenbalm/Black Hills Tank
R/J TANK	Rosenbalm/Johnson Flying Service Tank
R/SQ TANK	Rosenbalm/SIS Q Flying Service Tank
TW TANK	Transwest Air Service Tank
WA TANK	Waig Tank

( ) TC Aircraft licensed under when tank is a separate STC installation, primarily military aircraft

SECTION IX

REVISION SUMMARY

SECTION IX

REVISION SUMMARY

REVISION	PAGE(s)	DESCRIPTION
July 1998	Numerous	Complete Revision, Changes not noted. See IAB Meeting Notes from December 2-3, 1997, for changes.