

Airport Fire and Rescue Equipment Requirements



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Goals of this Section

- Understand various **Aircraft Rescue and Fire Fighting (ARFF)** requirements for airports
- Fire fighting agents
- FAR Part 139 airports (airports that receive commercial flights)
- ARFF Response times
- ARFF physical location at an airport

References for Airport ARFF Requirements

- FAA Advisory Circular 150/5220-10E
- ACRP Risk Assessment of Proposed ARFF Standards
- ICAO Aerodrome Manual Volume 2



**U.S. Department
of Transportation**
Federal Aviation
Administration

Advisory Circular

Subject: Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles	Date: 6/01/2011	AC No.: 150/5220-10E
	Initiated by: AAS-100	Change:

1. **PURPOSE.** This advisory circular (AC) provides an interactive specification that airports can use in procuring Aircraft Rescue and Fire Fighting (ARFF) vehicles.
2. **SCOPE.** The three main phases of the ARFF vehicle procurement process are presented in this AC, including the:



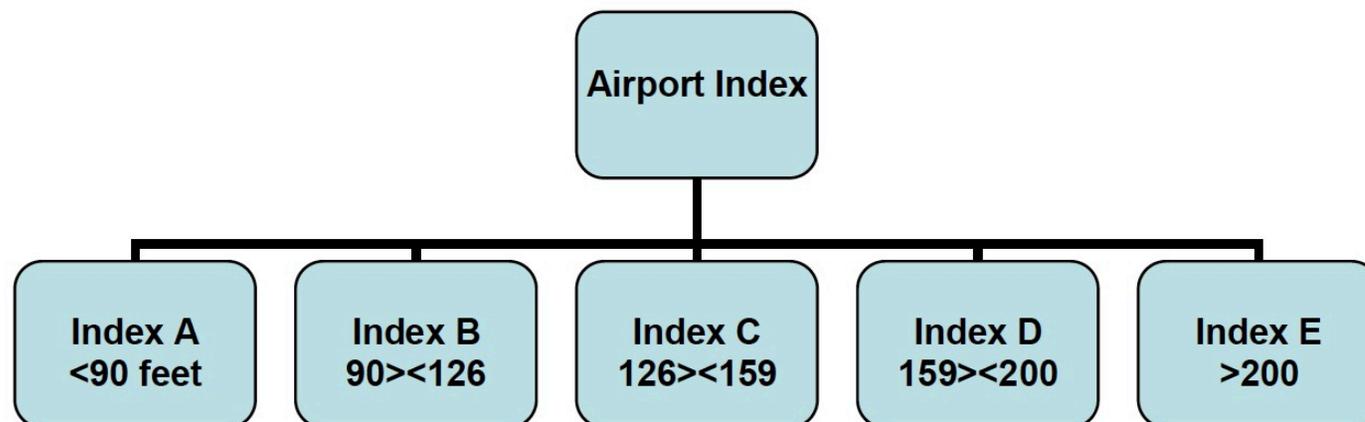
Risk Assessment of Proposed ARFF Standards

DETAILS

0 pages | 8.5 x 11 | PAPERBACK
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Airport Index

- Aircraft length is used to determine an the airport index
 - Index A - aircraft fuselage length < 90 feet
 - Index B includes aircraft at least 90 feet but less than 126 feet in length
 - Index C includes aircraft at least 126 feet but less than 159 feet in length
 - Index D includes aircraft at least 159 feet but less than 200 feet in length
 - Index E includes aircraft at least 200 feet in length



source: FAA AC 150/5220-10E

Example Airport Indices vs Aircraft Types

Index	Fuselage Length (Feet)	Representative Aircraft Types
A	< 90	Cessna 172, Beech 36, Cessna 421, Learjet 35, Beech B300, Cessna 550, Falcon 50, Challenger 605
B	90 to < 126	CRJ-900, CRJ-200, E145, E135, EMB-190
C	126 to < 159	Boeing 737-800, Airbus A320, Boeing 757-200
D	159 to < 200	Boeing 767, Airbus A330-200, Douglas DC-10, Boeing 787-8,
E	>= 200	Airbus A330-300, Boeing 747, Airbus A340, Boeing 777-200, Boeing 787-9

Comparison of FAA and ICAO ARFF Standards

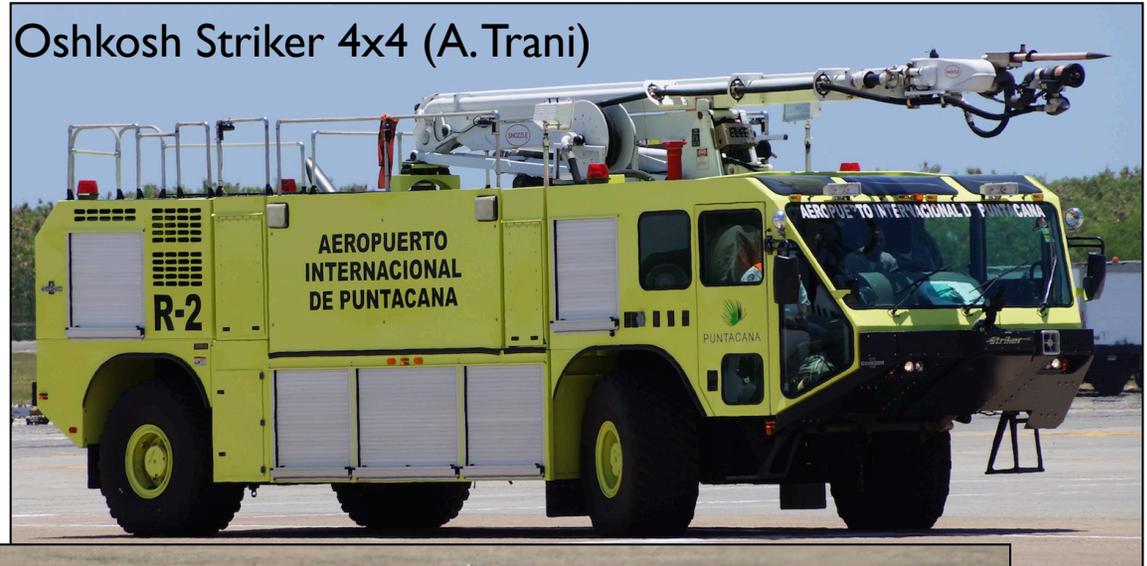
FAA Airport Index	Aircraft Length (ft.)	ICAO Airport Cat.	Aircraft Length (ft.) up to but not including	Width up to but not including	NFPA Airport Cat.	Aircraft Length up to but not including	Width up to but not including	Sample Aircraft
A	<90'	4	78' 24m	13.1' 4m	4	78'	13.0'	EMB120
A	<90'	5	91' 28m	13.1' 4m	5	90'	13.0'	CRJ-200; Saab 340
B	90' <126'	6	127' 39m	16.4' 5m	6	126'	16.4'	DC-9, A320
C	126' <159'	7	160' 61m	16.4' 5m	7	160'	16.4'	B757-200; B767- 200ER
D	159' <200'	8	200' 61m	22.9' 7m	8	200'	23.0'	A300; B757-300
E	>200'	9	249' 76m	22.9' 7m	9	250'	23.0'	A340-600; B777
E	>200'	10	295' 90m	26.2' 8m	10	295'	25.0'	AN-225, A380

source: ACRP Risk Assessment of Proposed ARFF Standards, National Academies, 2010
 NFPA = National Fire Protection Agency

Fire Fighting Agents

- Sodium-based dry chemical
- Potassium-based dry chemical
- Halogenated (gaseous clean agents)
- Water/AFFF

Oshkosh Striker 4x4 (A. Trani)

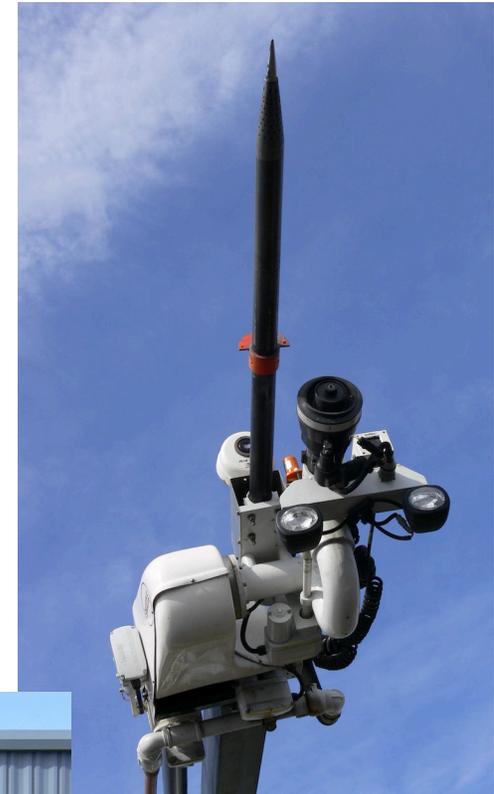


Oshkosh Striker 6x6 (A. Trani)

Classes of ARFF Vehicles and Agents

VEHICLE CLASS	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
	100 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs)	300 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs)	500 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs)	1500 Gallon Water/AFFF	3000-4500 Gallon Water/AFFF
AIRPORT INDEX	(Note 1)	(Note 1)	(Note 1)		(Note 1)
A	1	In lieu of Class 1	In lieu of Class 1 or 2	N/A	N/A
B	1	In lieu of Class 1	In lieu of Class 1 or 2	1 (Note 2)	N/A
C	1	In lieu of Class 1	In lieu of Class 1 or 2	2	
D	1	In lieu of Class 1	In lieu of Class 1 or 2	1	1
E	1	In lieu of Class 1	In lieu of Class 1 or 2		2

Example Class 4 ARFF Vehicle



Oshkosh Striker 4x4
Boom Nozzle and
Infrared Camera
(A. Trani)



Oshkosh Striker 4x4
Gross Weight 28,160 kg (62,000 lb)
Water tank 1500 gallons
Foam tank 210 gal.
Boom nozzle turret ~ 350-700 gal/
min
Bumper turret ~300 gal/min
Max. speed > 70 mph

source: Oshkosh

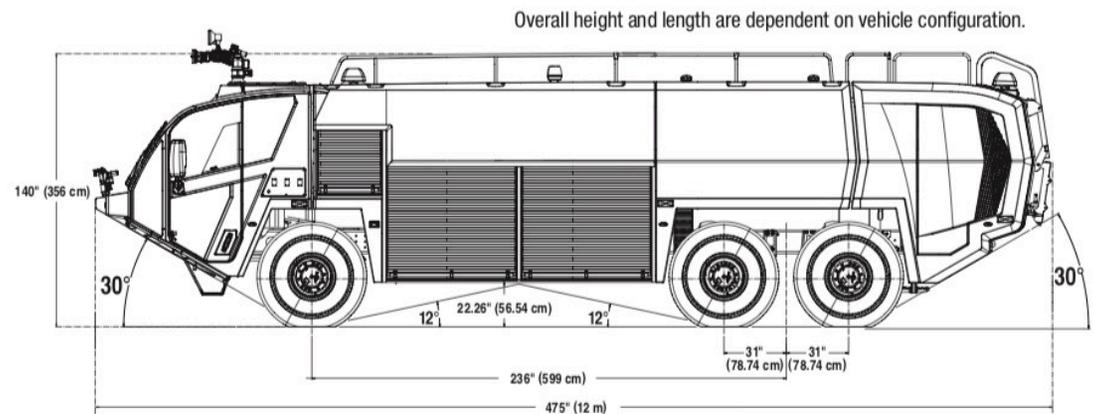
Example Class 5 ARFF Vehicle



source: A. Trani

- Oshkosh Striker 6x6
- Gross Weight 42,184 kg (93,000 lb)
- Water tank 3000 gallons
- Foam tank 420 gal.
- Roof turret ~ 625-1200 gal/min
- Bumper turret ~300 gal/min
- Max. speed > 70 mph

source: Oshkosh



source: Oshkosh

Number of Vehicles Required

ICAO/NFPA Airport Category	FAA Airport Index	Vehicles			Example Aircraft
		ICAO	FAA	NFPA	
4	A	1	1	1	DHC-8-100
5	A	1	1	2	ATR-72
6	B	2	1 - 2	2	B-737-300; Emb-145
7	C	2	2 - 3	3	B-757
8	D	3	3	3	A300; B-767-300
9	E	3	3	4	B-747-200; A340-400
10	E	3		4	AN-225; A380

- These are minimum requirements
- The actual number of vehicles deployed may be higher to meet the 3-minute response time to the furthest runway end point

Comparison of Water/Agent Quantities

ICAO/NFPA Airport Category	FAA Airport Category	Water (U.S. Gallons), Q1+Q2			Example Aircraft
		FAA	ICAO	NFPA*	
4	A	100	634	730	DHC-8-100
5	A	100	1,427	1,510	ATR-72
6	B	1,500	2,087	2,490	B737; Emb-145
7	C	3,000	3,197	3,630	B757
8	D	4,000	4,808	5,280	A300; B767-300
9	E	6,000	6,419	7,070	B747-200; A340-400
10	E	6,000	8,533	9,264	AN225, A380

*In addition to Q1 and Q2, NFPA requires an additional quantity of water, Q3, which ranges from 600 gallons for Category 4 to 5000 gallons for Category 10.

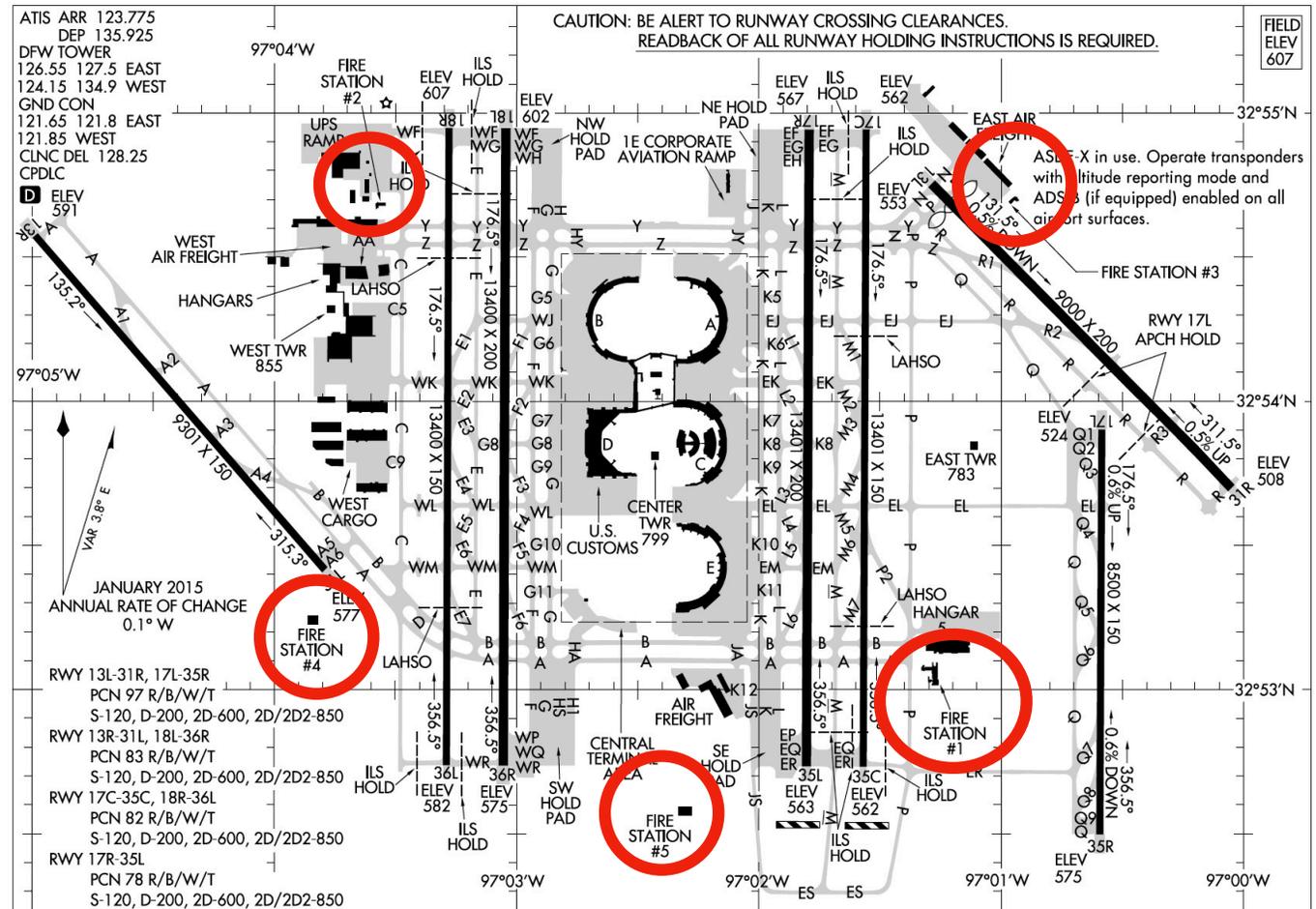
Note: NFPA standards have, historically, being more strict than FAA standards

Response Time Requirements

- FAA requires 3 minutes for the first ARFF vehicle to reach the furthest air carrier runway location (ICAO requires 3 minutes as well)
- Four minutes for sub-subsequent ARFF vehicles
- Such standards dictate the location(s) of the ARFF stations

DFW has 5 fire stations to meet with the FAA response time requirement

Note the layout of the fire stations (towards the runway end points)



Airport Access to ARFF Equipment

- Provide airport perimeter access paths to ARFF equipment
- Facilitates meeting 3-minute access requirement
- Paths should not involve steep slopes

Access path to approach lights can also be used by ARFF equipment

Following a Cirrus SR-20 on-board Oshkosh Striker 4x4



ARFF Vehicles in Action / Training



Miami (A.Trani)



Chicago ORD (A.Trani)



New York JFK (A.Trani)