



ASTM INTERNATIONAL
Helping our world work better

ASTM International Unmanned Systems Portfolio

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ANSI UAS Collaborative

www.astm.org



What is ASTM?

A Proven and Practical System

- Established in 1898
- 149 Committees & 12,500+ Standards
- 32,000 members
 - 8,000+ International Members from 135 countries
 - 5,100 ASTM standards used in 75 countries
- Accreditation:
 - American National Standards Institute (ANSI)
 - Standard Council of Canada (SCC)
- Process complies with WTO principles:
Annex 4 of WTO/TBT Agreement



Over a Century of Openness



How We Work

- **Provide Infrastructure and Tools**
 - Templates, Online balloting, Online collaboration areas, meetings support, managers, administrative support, editors, promotional support
- **Industry comes Together:**
 - Experts, individuals, organizations, academia, regulators, trade associations, consultants and consumers
 - Exchange expertise and knowledge
 - Participating in a transparent process – open to anyone, anywhere
- Staff does not write standards, remain neutral
- Programs & Services are Industry Driven





F38 Unmanned Aircraft Systems

Quick facts:

Formed: 2003, memorandum agreement with FAA
Current Membership: 180+ members (30 regulators)
Standards: 13 approved; 12 in development

Subcommittees:

F38.01 Airworthiness

- Hardware oriented
- Safe design, construction, test, modification, & inspection of the individual component, aircraft, or system

F38.02 Flight Operations

- Procedure/performance oriented
- Safe employment of the system within the aviation environment among other aircraft & systems

F38.03 Personnel

- Crew oriented
- Safe practices by the individuals responsible for employing the system

Global Representation

Argentina
Australia
Bahamas
Canada
China
France
Germany
Italy
Korea, Republic of
Netherlands
New Zealand
Norway
United Kingdom
United States



F38 Unmanned Aircraft Systems

Key Standards:

[F2908](#) Specification for Aircraft Flight Manual (AFM) for a Small Unmanned Aircraft System Operations

[F2909](#) Practice for Maintenance and Continued Airworthiness of Small Unmanned Aircraft Systems

[F3178](#) Practice for Operational Risk Assessment

[F3196](#) Practice for Seeking Approval for Extended/Beyond Visual Line of Sight Operations

Under Development

[WK29229](#) Practice for Certification of Pilots, Visual Observers, and Instructor Pilots and Training courses for sUAS

[WK28019](#) Practice for Selecting sUAS Launch and Recovery

[WK52089](#) Specification for Operations Over People

Areas Include:

*Design &
Construction*

Design & Command

Design & Performance

Production Acceptance

QA

*Batteries
Fixed Wing & VTOL*

Safely Bound Flight Behavior

Software Dependability

Registration & Marking



E54 Homeland Security Applications

Quick facts:

Formed: 2003

Current Membership: 355+

Standards: 56 approved; 85 in development

Subcommittees:

[E54.01](#) CBRNE Sensors and Detectors

[E54.02](#) Emergency Preparedness, Training, and Procedures

[E54.03](#) Decontamination

[E54.04](#) Personal Protective Equipment (PPE)

[E54.05](#) Building and Infrastructure Protection

[E54.06](#) Electronic Security Systems

[E54.08](#) Operational Equipment

[E54.09](#) Response Robots

Key Stakeholders

Dept. of Commerce

*Dept. of Homeland
Security*

Dept. of Justice

US Army

Chesapeake Testing

NFPA

NIOSH / NPPTL

NIST



E54.09 Response Robots

Key Standards:

- **E2592** Practice for Evaluating Response Robot Capabilities: Logistics: Packaging for Urban Search and Rescue Task Force Equipment Caches
- **E2854** Test Method for Evaluating Emergency Response Robot Capabilities: Radio Communication: Line-of-Sight Range
- **E2855** Test Method for Evaluating Emergency Response Robot Capabilities: Radio Communication: Non-Line-of-Sight Range
- **E2853** Test Method for Evaluating Emergency Response Robot Capabilities: Human-System Interaction (HSI): Search Tasks: Random Mazes with Complex Terrain

Under Development

- WK33260 Evaluating Emergency Response Robot Capabilities: Human-System Interaction (HSI): Navigation Tasks: Hallway Labyrinths with Complex Terrain
- WK55025 Evaluating Response Robot Capabilities: Energy/Power: Endurance

Areas Include:

Maneuvering

*Gaps, Hurdles, Incline, Stairs, Ramps, Angles, Labyrinths
Complex Terrain, sensors*

Mobility

Sand, gravel, confined spaces

Manipulation

Inspections, constrained space, placements, extractions, grasping, rotating

Sensing

Point & Zoom, Video, Thermal image, Color Matching

E54.09 Response Robots

Aerial Response Robots - Under Development

- **Safety:** Impact forces; lights & sounds; prop guards, sense & avoid; lost power behaviors; lost communication behaviors; lost GPS behaviors
- **Situational Awareness:** Point & Zoom Cameras; Inspect Planar Targets; Inspect Spiral Targets; Inspect Omnidirectional Targets; Search Wide Areas; Map Wide Areas; Navigate and Map Hallway Labyrinths
- **Operation:** Pre-flight Readiness Assessment & Launch & Recovery Procedures
- **Sensing:**
 - Visual: Image Acuity; Dynamic Range, Color Acuity
 - Thermal: Image Acuity; Dynamic Range
 - Latency of Video, Audio and Control
 - Audio Speech Acuity
- **Radio Communications:** Line of Sight, Non-Line of Sight, Attenuated Range; Interference Range
- **Energy / Power:** Endurance Range (with & w/out payload); Dwell Time
- **Maneuvering:** Follow Lines While in Up & Down Range Orientation; Orbit a Point; Precision Landing; Negotiate through Wires, Pass through Windows and Slalom Obstacles
- **Logistics:** Configuration Identification; Packaging for Urban Search & Rescue Equipment
- **Guides:** Aerial Response Robot Purchasing; Response Robot Training; Response Robot test apparatuses

ASTM UAS Portfolio



F39 Aircraft Systems

Formed in 2004

Membership – 110+

Standards – 6 approved, 9 draft

Subcommittees - 5

Covering:

Design, Alteration, and Certification (avionics/aircraft)

Inspection, Alteration, Maintenance, and Repair

Design, Alteration, and Certification of Electric

Propulsion Systems

Key Standards (certified aircraft)

[F2490](#) Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis

[F2639](#) Standard Practice for Design, Alteration, and Certification of Aircraft Electrical Wiring Systems

[F2696](#) Standard Practice for Inspection of Aircraft Electrical Wiring Systems

[F2799](#) Standard Practice for Maintenance of Aircraft Electrical Wiring Systems

E06 Performance of Buildings

Formed in 1946

Membership - 1320+

Standards - 270+

Subcommittees - 23

E06.55 Performance of Building Enclosures

Visual Inspection of Building Facade using Drone (WK58243)

Objectives

- Procedures & methodologies
- Visual Inspections
- Documenting façade condition
- Video & Still
- Reporting

*Drone operational scenarios under consideration for mapping & alignment



F32 Search and Rescue

Quick facts:

Formed: 1975

Current Membership: 80 members

Standards: 65 approved; 15 in development

Subcommittees:

F32.01 Equipment, Testing and Maintenance

– Hardware product and hardware testing oriented

F32.02 Management and Operations

– Guides for Training and Evaluation

F32.03 Personnel, Training and Education

– Crew oriented

– Safe practices by the individuals responsible for employing the system

Key Stakeholders

CMC Rescue Inc.

*Pigeon Mountain
Industries*

US Naval Research Lab

Various Sheriff Dept's

*Maryland State
Fireman's Association*

*Various State & Local
Search & Rescue
Agencies*



F32 UAS Standards

Under Development

- WK54226 Standard Guide for sUAS Operations in Search and Rescue Operations
- WK52858 Standard Classification for the Typing of Unmanned Ariel Vehicles (UAVs) for Land Search and Rescue
- WK55596 Standard Guide for Training of sUAS Pilots and Crew Members for Land Search and Rescue

Covering:

Specification and Testing for Search and Rescue

Hardware

Guides for Management

Operations and Training Guides for Various Search and Rescue Operation

Related Technical Committees



Inspections:

D04 Road and Paving... (*inspections*)

E06 Performance of Buildings (building inspections)

A01 Steel... (*Railroad Inspections*)

Materials:

D20 Plastics

D30 Composite Materials

E56 Nanotechnology

F42 Additive Manufacturing

Technologies (component / mtl printing)

Testing:

E07 Nondestructive Testing

E54 Homeland Security Applications

Operations:

E57 3D Imaging (geospatial)

F15 Consumer Products (toys)

F32 Search and Rescue (wilderness)

System:

F37 Light Sport Aircraft

F38 Unmanned Aircraft Systems

F39 Aircraft Systems

F44 General Aviation Aircraft
(*Part 23 Certified aircraft*)

Contact Information



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