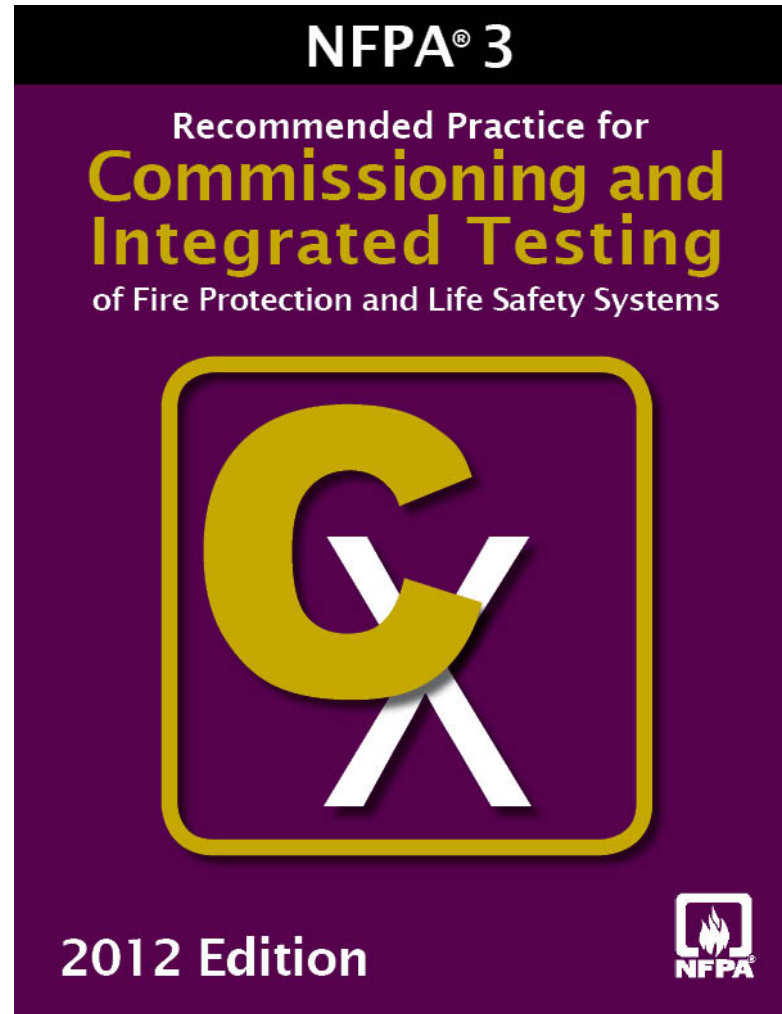


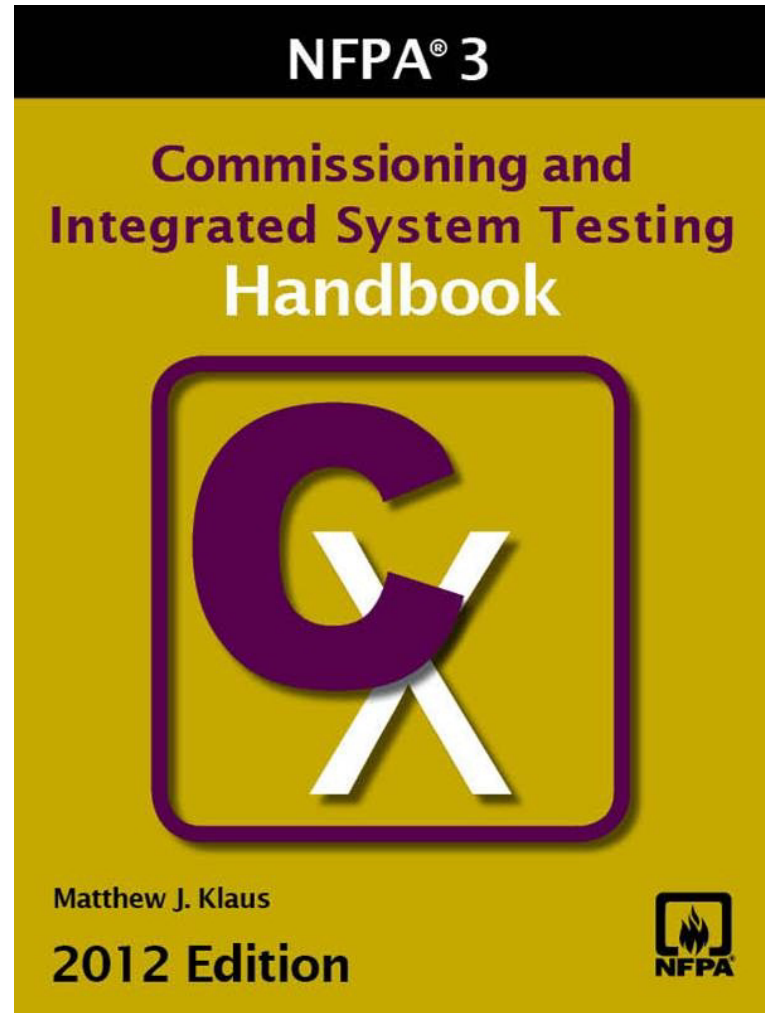
# **NFPA 3 and 4—Commissioning and Integrated Testing of Fire Protection and Life Safety Systems**

Matt Klaus  
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NFPA

# The Recommended Practice



# Coming Soon



# Overview

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- What is Commissioning?
- NFPA 3 – How Did It Begin
- The Process
- The People
- Activities and Forms
- NFPA 4

# What Is Commissioning?

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- Quality Assurance / Quality Control
- Best Practice
- Project Management
- Administrative Program

# What Is Commissioning?

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**3.3.3.1 Commissioning (Cx).** A systematic process that provides documented confirmation that specific and interconnected fire and life safety systems function according to the intended design criteria set forth in the project documents and satisfy the owner's operational needs, including compliance requirements of any applicable laws, regulations, codes and standards requiring fire and life safety systems.

# Goals & Objectives

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- Documentation of:
  - Owners Project Requirements (OPR)
  - Basis of Design (BOD)
  - Systems installed as required
  - Performance and documentation of integrated testing
  - As-built drawings & O&M's
  - Training
  - IT&M

# What Commissioning Isn't

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**Commissioning  $\neq$  Integrated  
Testing**



# Origins of NFPA 3

## NIBS Total Building Commissioning

- Guideline 1 - ASHRAE, HVAC&R System
- Guideline 2 - ASCE, Structural Systems
- Guideline 3 – BETEC, Exterior Envelope Systems
- Guideline 4 – NRCA, Roofing Systems
- Guideline 5 – AWCI, Interior Systems
- Guideline 6 – NEII, Elevator Systems
- Guideline 7 – ASPE, Plumbing Systems
- Guideline 8 – IES, Lighting Systems
- Guideline 9 – IEEE, Electrical Systems
- Guideline 10 – NFPA, Fire Protection Systems
- Guideline 11 – TIA, Telecommunications Systems

# Where Does It Fit?

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- Design Installation Standards- NO
- ITM Standards -NO
- Building Code -NO
- Fire Prevention Code - NO

# New Project

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- The Council voted to establish a new project on Fire Protection Systems Commissioning (July 27, 2007 – 07-7-16)
- A call for members for the new technical committee is issued.

# Original Committee Structure

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- Enforcers
  - Boulder, CO
  - Carmel, CA
  - Clarke County, LV
  - Manufacturers
  - Viking
  - Tyco/Simplex Grinnell
  - Fike

# Original Committee Structure

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- Special Experts
  - RJA
  - Hughes Associates
  - Insurance
  - Liberty Mutual
  - FM Global
  - Installer/Maintainer
  - Century Fire Protection
  - Bay Alarm Company

# Original Committee Structure

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- Labor
  - Sprinkler Local 704
  - Users
  - Harvard University
  - US Navy
  - GSA
  - Research and Testing
  - UL

# Committee History

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- Kick-off Meeting – December 2007
- Follow Up Meetings
  - March 2008
  - October 2008
  - March 2009
  - ROP Meeting – San Francisco – July 2009
  - SLIPPED CYCLE
  - ROP Meeting – Charlotte – April 2010
  - ROC Meeting – Phoenix 2010

# Document Split

- October 2011 – CMF TC Recommends Split of NFPA 3
  - RP on Commissioning (NFPA 3)
  - Standard on Integrated Testing (NFPA 4)
- Standards Council Approved
- Reconstitute TC
- CMI TC Formed



# Committee Scope

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*This committee shall have primary responsibility for documents that pertain to commissioning activities and tasks for fire and life safety systems. (Approved August 2008)*

# Document Scope

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This recommended practice provides the recommended procedures, methods, and documentation for commissioning and integrated testing of active and passive fire protection and life safety systems and their interconnections with other building systems.

# How is the Scope Accomplished

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- A.3.3.3.1 Commissioning (Cx).  
Commissioning is achieved in the design phase by documenting the design intent and continuing throughout construction, acceptance, and the warranty period with actual verification of performance, operation and maintenance (O&M) documentation verification, and the training of operating personnel.

# Organization

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1. Administration
2. Referenced Publications
3. Definitions
4. Qualifications of Commissioning Personnel
5. Commissioning
6. Integrated Systems Commissioning
7. Integrated System Testing

# Organization

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8. Re-commissioning (Re-Cx) and Retro-commissioning (RCx) of Fire Protection and Life Safety Systems
9. Commissioning Documentation and Forms

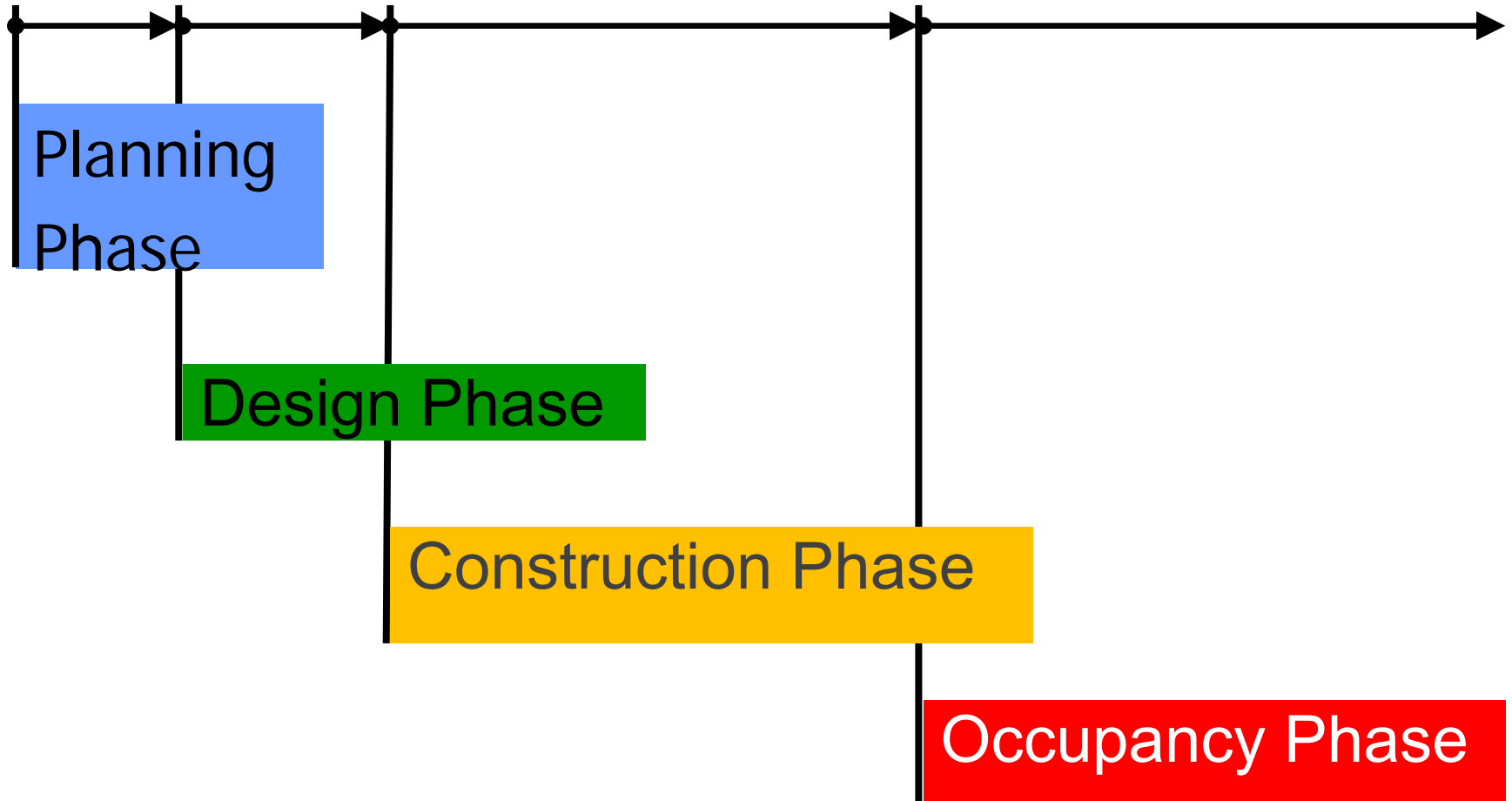
# Organization

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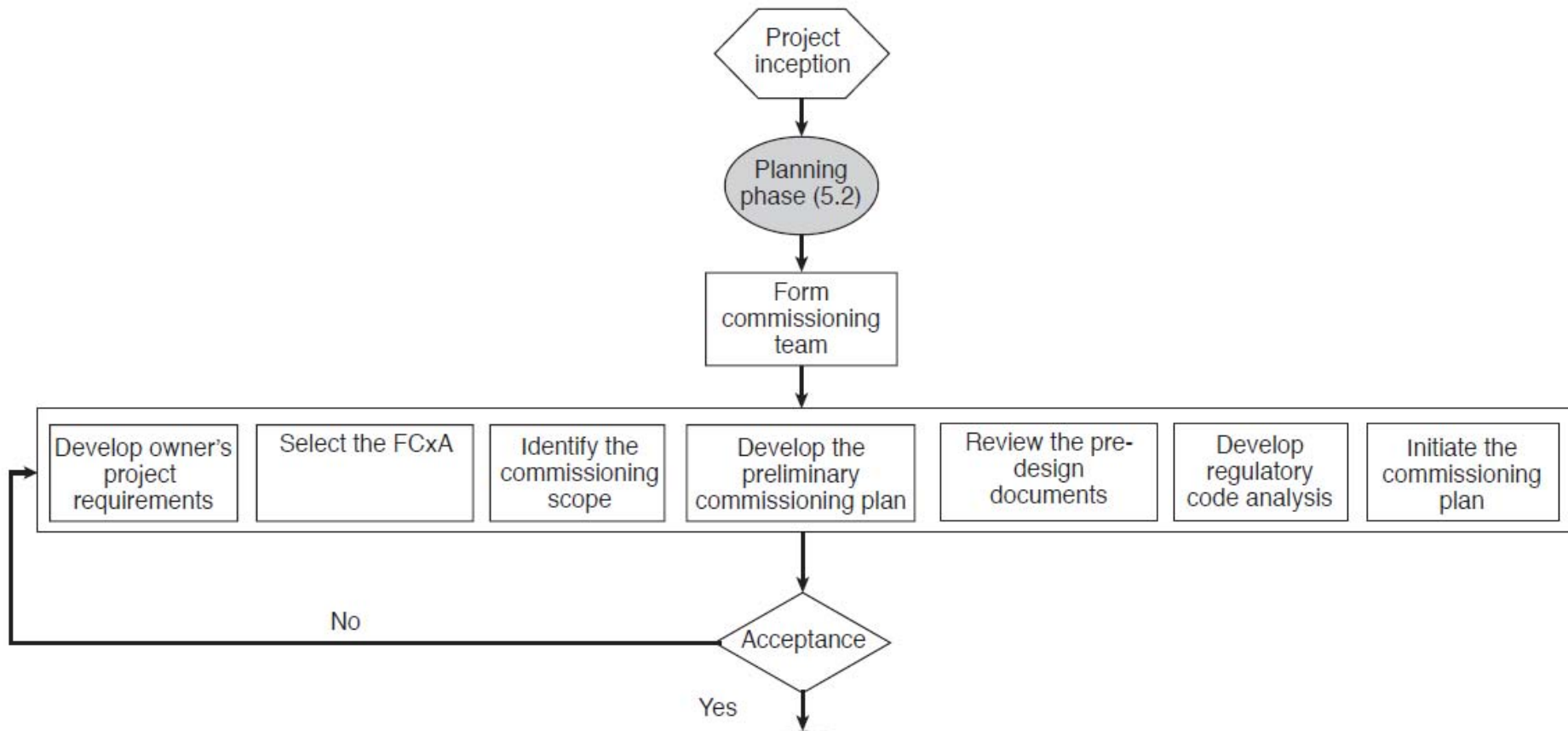
## Annexes

- A. Explanatory Material
- B. Sample Basis of Design Narrative Report
- C. Commissioning Documentation
- D. Informal References

# Chapter 5 – The Cx Process

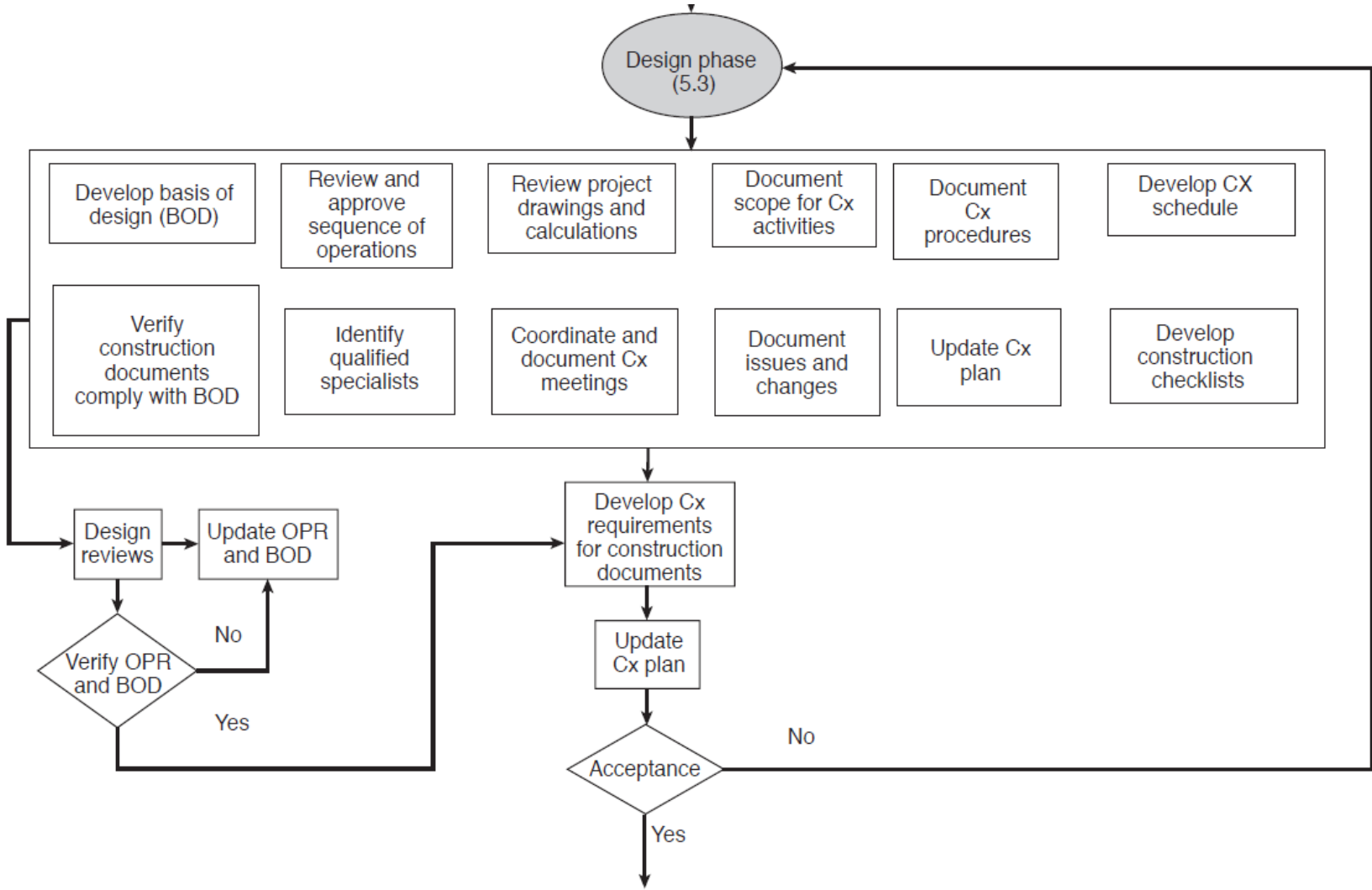


# Planning Phase

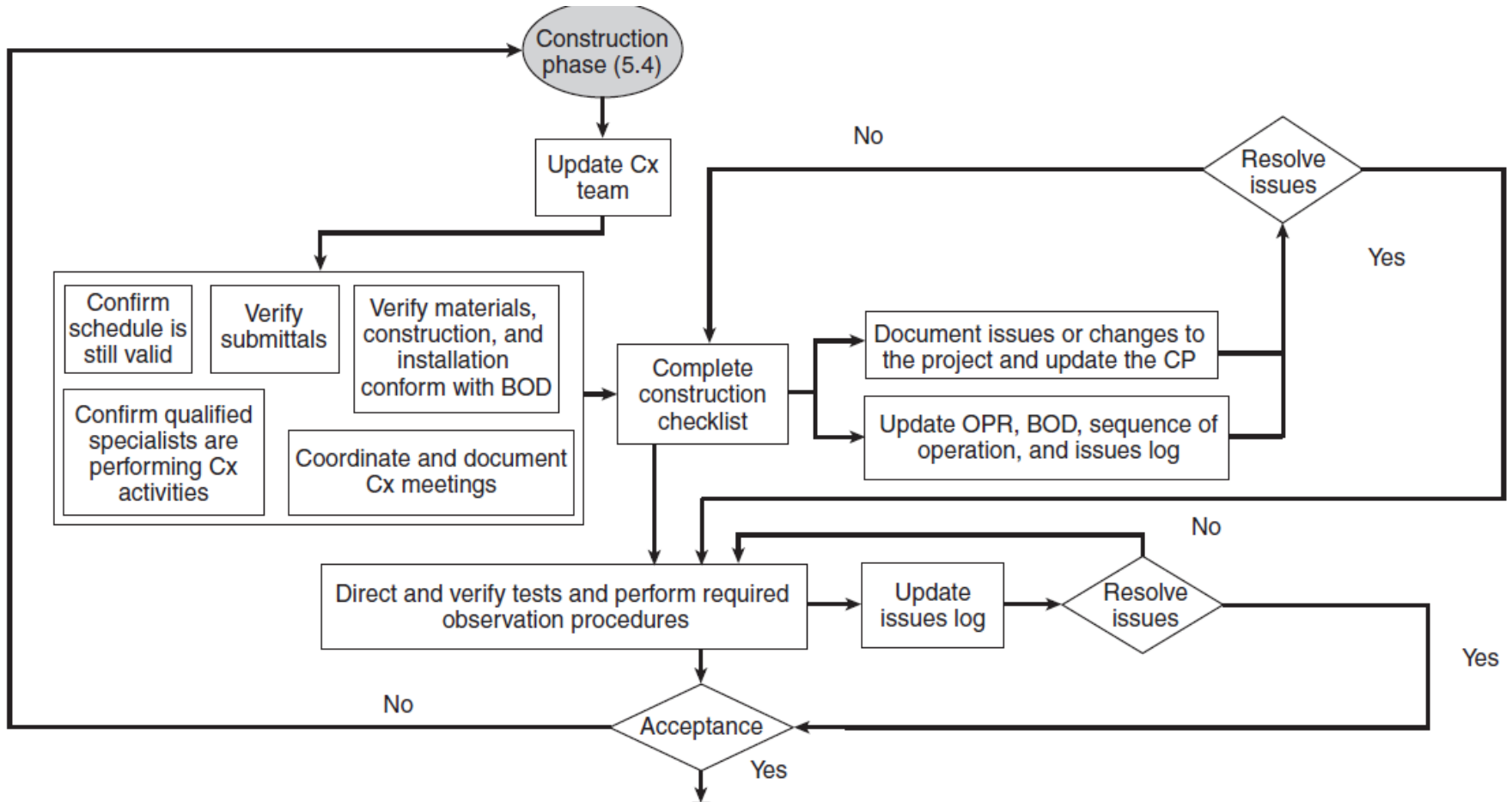




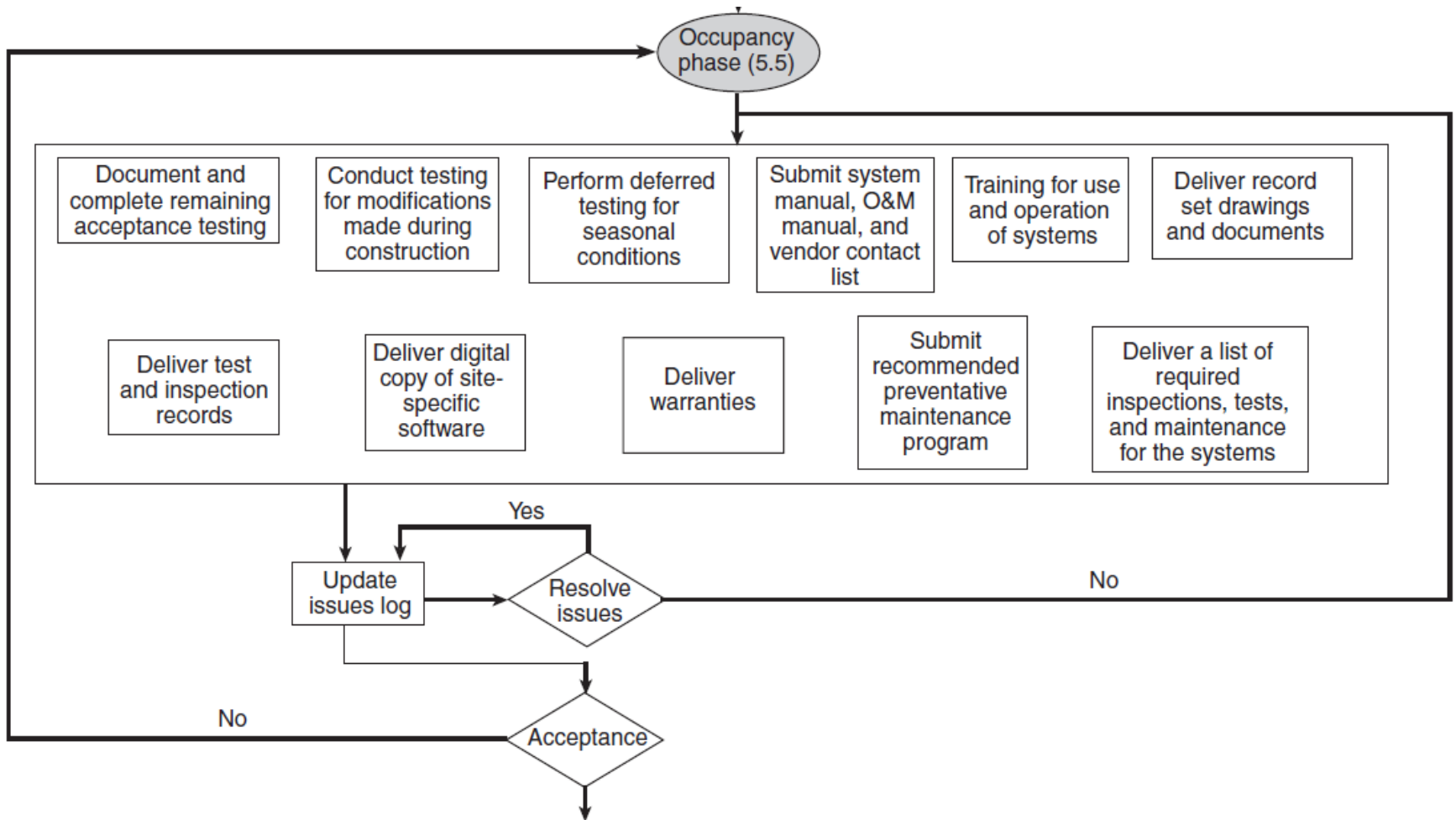
# Design Phase



# Construction Phase



# Occupancy Phase



# The Cx Team

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- (1) Owner
- (2) Commissioning authority
- (3) FCxA
- (4) Installation contractor(s)
- (5) Manufacturer's representatives
- (6) RDP(s)
- (7) Construction manager/general contractor
- (8) Owner's technical support personnel
- (9) Facility manager or operations personnel
- (10) Insurance representative
- (11) Third party test entity
- (12) AHJ
- (13) Integrated Testing agent (ITa)

# Fire Commissioning Agent (FCxA)

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- ❑ The FCxA should be knowledgeable and experienced in the proper application of commissioning recommendations of this recommended practice and general industry practices.
- ❑ A qualified FCxA should have an advanced understanding of the installation, operation and maintenance of all fire protection and life safety systems to be installed, with particular emphasis on system integrated testing.

# Registered Design Professional (RDP)

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A qualified RDP should have comprehensive knowledge of the following:

- (1) The design, installation, operation, and maintenance of all systems proposed to be installed
- (2) How individual and integrated systems operate during a fire or other emergency

# Facilities Management Personnel

- Facilities management personnel should have the ability to perform the following:
  - (1) Assess a facility's need for building systems and recommend building systems
  - (2) Oversee the operation of building systems
  - (3) Establish practices and procedures
  - (4) Administer the allocation of building systems resources

# Facilities Management Personnel

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- (5) Monitor and evaluate how well building systems perform
- (6) Manage corrective, preventative, and predictive maintenance of building systems
- (7) Develop and implement emergency procedures and disaster recovery plans.



# Authority Having Jurisdiction (AHJ)

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- The AHJ should be knowledgeable in the applicable codes, ordinances, and standards as they relate to the fire protection and life safety systems installed.
- The AHJ should have the ability to interface with the RDP and the commissioning authority in all phases of the commissioning process.

# Integrated Testing Agent (ITa)

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- The ITa should have an understanding of the design, installation, and operation and maintenance of the type of fire protection and life safety systems installed.
- The ITa should demonstrate experience and knowledge of performance verification methods to validate functionality of integrated systems and components

# Commissioning Activities (Ch 5)

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- Planning Phase
  - Establish Cx Team
  - Develop OPR
    - Infrastructure
    - Height, Area and Occupancy
    - Applicable Codes and Standards
    - User and Training Requirements (Program)
    - Third Party Requirements
  - Develop Cx Plan
    - Scope and Schedule
    - Tasks, Testing procedure and training

# Commissioning Activities (Ch 5)

- Design Phase
  - Develop BOD
    - Description of Project
    - Description of System
    - Performance Objectives
    - Testing Requirements
    - ITM Requirements
  - Review and Approval of Sequence of Operations
  - Develop Schedule
  - Develop Roles and Responsibilities Matrix

# Commissioning Activities (Ch 5)

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- Construction Phase
  - Update/Verify Schedule
  - Construction Inspections
    - Pre-con Inspections
    - Rough-in Inspections
    - Finish Inspections
  - Testing and Inspection
    - Passive and Active
  - Acceptance Testing

# Integrated System Cx (CH 6)

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- Narrative Report
  - Sequence of Operations
  - Performance Objectives
  - System Impacts
  - Design Methodology
  - Materials and Equipment Logs
  - Design Documents (Drawings and Specs)
  - Testing procedures
  - Testing Frequencies

# Integrated System Testing (Ch 7)

- In new construction, integrated testing of fire protection and life safety systems should occur following:
  - (1) Verification of completeness and integrity of building construction.
  - (2) Individual system functional operation and acceptance as required in applicable installation standards tests.
  - (3) Completion of pre-functional tests of integrated systems.

# Integrated System Testing (Ch 7)

- Integrated testing should demonstrate that the final integrated system installation complies with the specific design objectives for the project and applicable codes and standards
- Written documentation of the testing and inspection should be provided.
- Testing should be repeated if changes are made to systems.



# Integrated Test Frequency (Ch 7)

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- An integrated testing plan specifying the interval for integrated testing should be submitted and approved where required by the AHJ.

# Re-commissioning (Re-Cx) and Retro-commissioning (RCx) (Ch 8)

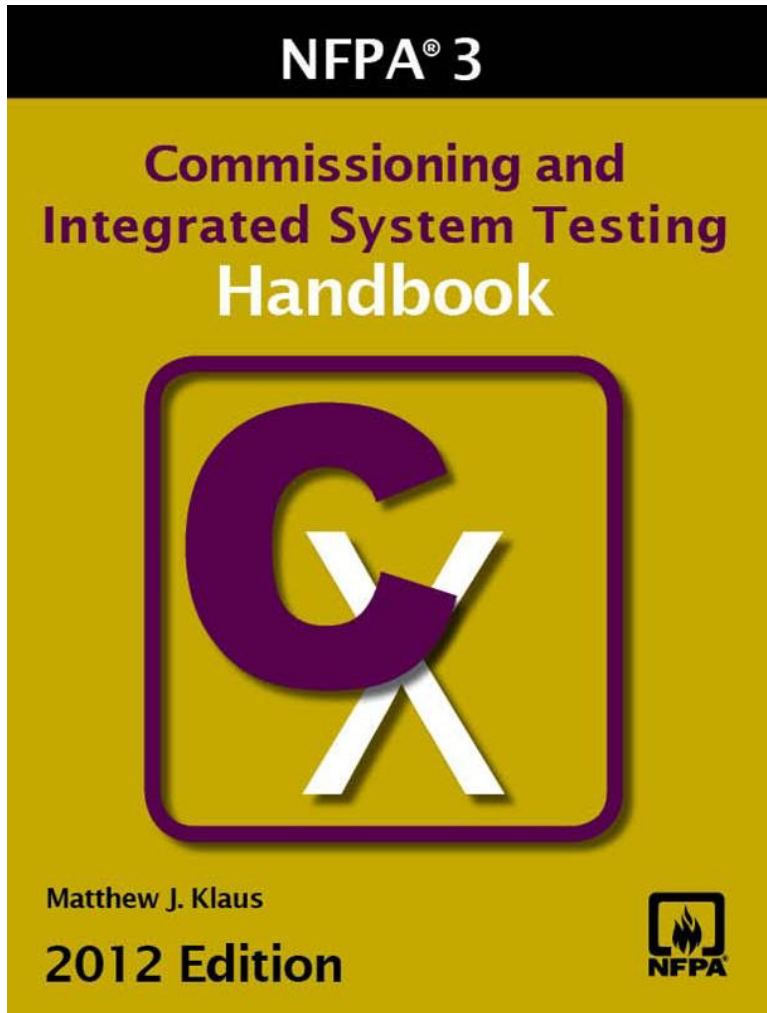
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- Fire protection and life safety systems that have been commissioned upon installation in accordance with the commissioning process of Chapter 5 of this standard should be re-commissioned as specified by a re-commissioning plan.
- Where testing of existing fire protection and life safety systems has not been conducted in accordance with the commissioning process of Chapter 5 of this standard, retro-commissioning should only be specified by a retro-commissioning plan.

# Sample R&R Matrix

<b>Legend</b> L = Lead P = Participate S = Support I = Inform A = Accept V = Verify	Owner	Facility Manager or Operations Personnel	Insurance Rep	Owner Technical Support	Construction Manager	Installation Contractor	C <sub>x</sub> Agent	RDP
<b>Planning Stage</b>								
Identify Commissioning Team	L/A	S	S	P/S				
Develop Owner's Project Requirements	L/A	S	S	S				
Develop preliminary commissioning scope	L	S	S	P/S				
Develop Preliminary Commissioning Plan	L	S	S	S				
Establish budget for all Cx work & integrate costs for commissioning into project budget	L	S		S				
Include time for Cx in initial project schedule	L	I	I	I				
Include Cx responsibilities in A/E & CM scope of services	L/A	S		S				
<b>Design Stage</b>								
Contract for Commissioning Agent Services	L/A	P		P	L			
Hold Design Stage Cx meetings	P	P	P	P	P		L	P

# More Information



- Sample Cx Plan
- Phase by Phase Walkthrough
- Additional Sample Forms
- Commentary on “who and Why”
- TC Contributors
- Examples of Cx Benefits
- Facts and Myths

# NFPA 4

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- New Standard
- Sibling Document to NFPA 3
- Pulls out CH 7 – Integrated Testing
- New Committee
- Draft to Public April 2012

# \*\*\*NFPA 4 STATUS\*\*\*

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- Draft Language
- 1 of 4 TC Meetings Complete
- Doesn't Incorporate PI
- Language May Change Drastically

# NFPA 4 Scope (DRAFT)

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- Addresses Integrated Systems Testing Procedure, Protocol and Personnel
- Does Not Deal With Individual System Testing or Performance
- Does not Require Test To Be Conducted

# Key Concepts

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- **3.3.26.4 End-to-End Integrated System Test.** A test of the response of one or more individual systems to an input on another individual system.
- **3.3.26.5\* Integrated System Test.** A test of integrated fire protection and life safety systems.
- **3.3.26.6\* Interface Test.** Any test of the interface between two individual systems that are part of an integrated system.



# Applied Scope

- **4.1 Conducting Integrated Tests**
- **4.1.1** This chapter shall apply to the testing of integrated systems provided for fire protection or life safety.
- **4.1.2** Personnel responsible for integrated testing shall meet the qualifications listed in 4.3.
- **4.1.3** Where required by codes, standards or regulations, integrated testing of new or existing fire protection and life safety systems shall occur.

# TC Meeting – NFPA 4

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- July 25 and 26
- NFPA Headquarters – Quincy, MA
- Draft Development
- Please register as a guest:  
[ecarroll@nfpa.org](mailto:ecarroll@nfpa.org) (Elena Carroll)  
or  
[mklaus@nfpa.org](mailto:mklaus@nfpa.org) (Matt Klaus)

# Thank You

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Questions or Comments