Oilfield Explosives Safety

API RECOMMENDED PRACTICE 67
THIRD EDITION, OCTOBER 2019

AMERICAN PETROLEUM INSTITUTE

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Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, NW, Washington, DC 20001, standards@api.org.

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1 Scope

This publication is applicable to chemical explosives used as an energy source to do work in oil- and gas-producing operations, and more specifically to explosives intended for use inside a wellbore. The purpose of this recommended practice (RP) is primarily to prevent the inadvertent initiation of these explosives at the wellsite but also includes some recommendations for safe and secure storage and transportation and handling, as well as requirements for design and manufacture of selected equipment.

Additionally, there are five annexes included as part of this RP that provide important guidance:

— Annex A: Critical Safety Equipment for Operations;

— Annex B: Explosive Arming and Disarming Safety Critical Fundamentals—Electric Detonators;

— Annex C: Recommended Safety Equipment and Processes;

— Annex D: Stray Voltage Worksheet;

— Annex E: Wellsite Audit Checklist;

With the exception of Annex A, these annexes have been provided as reference material; they are not intended to replace the full text of this document but rather are provided as supplemental information. Operating companies and/or service companies may establish more comprehensive and exhaustive materials, as they deem appropriate for their particular situation(s).

While some chemicals intended for various nonexplosive applications can prove explosive when misused (such as lithium batteries), it is not the intent of this RP to address these materials.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

IME Safety Library Publication 20 [1]: *Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators (Blasting Caps)*

MIL-DTL-23659F [2], *Detail Specification: Initiators, Electric, General Design Specifications for*

U.S. DOL Title 29 [3], *CFR* Part 1910.119, *Process Safety Management of Highly Hazardous Chemicals*

VG 95378-11:2014 [4], *Electromagnetic Compatibility (EMC)—Electromagnetic Compatibility of Electroexplosive Devices (EED)*—Part 11: *Test Procedure for Proof of Immunity to Disturbance of EED Towards Pulses of Electrostatic Discharge*

[1] Institute of Makers of Explosives, 1212 New York Ave, NW, Suite 650, Washington, DC 20005, www.ime.org.
[2] U.S. Department of Defense, 1400 Defense Blvd, Washington, DC 20301, www.everyspec.com.
[3] U.S. Department of Labor, 200 Constitution Ave, NW, Washington, DC 20210, www.dol.gov.
[4] German Institute for Standardization (DIN), Saatwinkler Damm 42/43, 13627 Berlin, Germany, www.din.de.

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

For purposes of this document, the following terms and definitions apply.

3.1.1
adiabatic heating
An increase in the temperature of a material without addition of heat.

EXAMPLE When the pressure of a gas is increased.

NOTE This can happen in pressure control equipment that has not been purged of air properly and pressure is introduced rapidly.

3.1.2
armed explosive device
A loaded explosive device to which the detonator or initiating device has been secured mechanically and/or electromechanically and is ready for use.

3.1.3
arming
The process of mechanically and/or electromechanically attaching a detonator or initiator to a loaded explosive device.

3.1.4
auto ignition
A spontaneous activation or initiation of a device containing explosive components, caused by elevated temperature or the rapid application of pressure when a seal is breached.

NOTE Auto ignition can produce a variety of reactions including detonation and deflagration that can also be time dependent. Depending on the chemical reaction, the auto ignition can lead to an event whereby the rate of activation increases over time, because the detonation or deflagration occurs after the initial activation.

3.1.5
ballistic arming
The act of mechanically configuring components in an explosive train such that initiation of the detonator or igniter will allow initiation of the next explosive component in the train to occur.

3.1.6
bullet perforating gun
A perforating gun using propellant-driven hardened steel bullets to penetrate the casing, cement, and formation.

NOTE Their use has been largely supplanted by jet perforators, but they are still in limited use.

3.1.7
cable safety circuit
An integral portion of the electric wireline unit that opens the electric wireline cable to prevent the application of current and resistively shunts the conductor to the cable armor.

3.1.8
cathodic protection system
A method of corrosion control utilizing an impressed DC current, making the protected structure a cathode, thus minimizing or eliminating corrosion.