



**American Water Works
Association**

The Authoritative Resource on Safe WaterSM

ANSI/AWWA B407-05
(Revision of ANSI/AWWA B407-98)

AWWA Standard

Liquid Ferric Chloride



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AWWA Standard

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Foreword

This Foreword is for information only and is not a part of ANSI/AWWA B407.

I. Introduction.

I.A. *Background.* Ferric chloride is commercially available in two solid forms, hexahydrate and anhydrous, and in liquid form. This standard describes ferric chloride in aqueous (liquid) form for use in the treatment of municipal and industrial water supplies. Ferric chloride can be produced as a coproduct with titanium dioxide from natural ores containing iron and titanium oxides or by the controlled reaction of spent steel pickling solutions, hydrochloric acid, chlorine, and scrap iron. A high-purity product can be manufactured by reacting chlorine gas with iron, ferrous sulfate, or ferrous chloride. Recognizing that the purity of ferric chloride can vary with the manufacturing process, the purchaser may request that the supplier describe the manufacturing process used. The purchaser also may want to ask the supplier about potential impurities relative to the manufacturing process used.

This standard provides methods for the analysis of specific gravity, insoluble matter, total iron, ferrous iron, ferric chloride, and acidity.

I.B. *History.* In 1977, the AWWA Water Quality Division recommended to the AWWA Standards Council that a standard for ferric chloride be prepared. The Standards Council authorized the development of a ferric chloride standard on May 12, 1977. The first edition of ANSI/AWWA B407 was approved by the AWWA Board of Directors on June 5, 1983. Subsequent revisions were approved by the AWWA Board of Directors in 1988, 1993, and 1998. This fifth edition of B407 was approved by the AWWA Board of Directors on June 12, 2005.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the original consortium included the American Water Works Association Research Foundation (AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.* Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including two standards developed under the direction of NSF, NSF†/ANSI‡ 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 60. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI 60 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of “unregulated contaminants” are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA B407 addresses additives requirements in Sec. 4.3 of the standard. The transfer of contaminants from chemicals to processed water or the residual solids is becoming a problem of great concern. The language in Sec. 4.3.2 is a recommendation only for direct additives used in the treatment of potable water to be certified by an accredited certification organization in accordance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects. However, users of the standard may opt to make this certification a requirement for the product. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

*Persons outside the US should contact the appropriate authority having jurisdiction.

†NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.

‡American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

II. Special Issues.

II.A. *Storage and handling precautions.* Liquid ferric chloride is an orange-brown aqueous solution that is acidic and corrosive to common metals. Suitable materials for construction of storage and handling facilities include titanium, tantalum, synthetic-rubber-lined steel, corrosion-resistant fiberglass-reinforced plastics (FRP), ceramics, tetrafluoroethylene polymer (PTFE), polyvinylidene fluoride (PVDF), and polyvinyl chloride (PVC). Steel, aluminum, copper, and polyamides, such as nylon, are not suitable.

Ferric chloride solution may cause burns to the eyes, and acid-resistant goggles should be worn during handling. Contact with skin may cause irritation. This can be avoided by wearing rubber gloves, boots, jacket, and pants.

For additional safety aspects, refer to material safety data sheets (MSDS) available from the chemical supplier or manufacturer.

II.B. *Basis for payment.* The basis for payment shall be the dry weight equivalent of ferric chloride supplied.

III. **Use of This Standard.** It is the responsibility of the user of an AWWA Standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser options and alternatives.* This standard for liquid ferric chloride permits a wide range of ferric chloride concentration. The purchaser should be aware of the wide range of water weight relative to the shipping cost.

The following items should be provided by the purchaser

1. Standard used—that is, ANSI/AWWA B407, Standard for Liquid Ferric Chloride, of latest revision.
2. Net weight to be supplied (Sec. II.B).
3. Whether compliance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, is required.
4. Whether specific gravity of the solution is stipulated (Sec. 4.1).
5. Percentage of ferrous iron permitted. If ferrous iron in excess of 2.5 percent is permitted, the purchaser should state the maximum allowable ferrous iron concentration (Sec. 4.2).
6. In the event that an analysis by a referee laboratory is required, the assignment of testing costs should be addressed (Sec. 5.12).
7. Size and type of container to be used (Sec. 6.2.1).

8. If weight certificates are required (Sec. 6.2.2).

9. Whether an affidavit of compliance, certified analysis, or both, is required (Sec. 6.3).

III.B. *Modification to standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. **Major Revisions.** Major revisions to the standard in this edition include the following

1. The maximum allowable insoluble matter by weight has been reduced from 0.5 percent to 0.2 percent (Sec. 4.2).

V. **Comments.** If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group at 303.794.7711, FAX at 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail at standards@awwa.org.



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AWWA Standard

Liquid Ferric Chloride

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes ferric chloride in aqueous (liquid) form for use in the treatment of municipal and industrial water supplies. Applications of the chemical include (1) water softening with lime or a combination of lime and soda ash to improve hardness reduction and coagulation, and (2) water clarification, as a coagulant, followed by settling or filtration.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for liquid ferric chloride, including physical, chemical, packaging, shipping, and testing requirements.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving liquid ferric chloride and can be used as a guide for testing the physical and chemical properties of liquid ferric chloride samples. The stipulations of this standard apply when this document has been referenced and then only to liquid ferric chloride used in the treatment of municipal and industrial water supplies.