1. Scope

Clause 3.4 of AS 4118.2.1-1995 permits the use of lightwall steel pipes and pipe systems that have been listed and approved for fire protection applications by internationally recognised bodies such as UL or FM.

Similarly, Clause 9.2 of AS 2419.1-2021 states that steel tubes and pipes must conform to a range of standards, including ASTM A53, ASTM A135/A135M, or ASTM A795/A795M, as well as Australian Standards.

This Technical Specification outlines the verification and recognition processes for Schedule 10 and 40 steel pipes intended for fire protection services for certification under CSIRO's ActivFire® Scheme to ANSI/UL 852 and/or FM 1630, with references to ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M.

It should be noted that this Technical Specification does not encompass the evaluation of steel pipes to ANSI/UL 852 and/or FM 1630 using ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M by CSIRO's Fire Systems Laboratory. Additionally, it excludes stainless steel pipes, copper pipes, and any other types of pipes.

2. Referenced Documents

Details of the documents referenced by this Technical Specification are detailed in Table 1.

Table 1 List of documents referenced by this Technical Specification

ANSI/UL 852, 2nd Edition, July 24,025	Standard for Safety – Metallic Sprinkler Pipe for Fire Protection Service.
FM Class Number 1630, June 2021	Examination Standard for Steel Pipe for Automatic Fire Sprinkler Systems.
AS 2118.1:2017 + A1:2017 + A2:2020 + A3:2024	Automatic fire sprinkler systems Part 1: General Systems.
AS 2419.1:2021	Fire hydrant installations Part 1: System design, installation and commissioning.
AS 4118.2.1-1995 + A1:2005	Fire sprinkler systems Part 2.1: Pipping – General.
ASTM A53/A53M, July 1, 2022	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
ASTM A135/A135M, March 1, 2021	Standard Specification for Electric-Resistance-Welded Steel Pipe.
ASTM A795/A795M, March 1, 2021	Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASME B36.10-2022	Welded and Seamless Wrought Steel Pipe
AS ISO/IEC 17025:2018	General requirements for the competence of testing and calibration laboratories

3. Pre-verification Requirements

In addition to the application requirements of CSIRO's ActivFire Scheme document AF-D001, the Applicant wishing to have their product evaluated and certified by CSIRO shall provide the following information and documentation:

1. The international standard the steel pipes conform to.
2. Sizes and wall thickness of the steel pipes.
3. The joining method of the steel pipe.
4. Finishing surface details of the steel pipes.
5. End finish options of the steel pipes.
6. Intended use of the steel pipes.
7. Quality management system of the Primary Manufacturing Unit (PMU).

4. Key requirements of the international standards

4.1. UL 852

The revised ANSI/UL 852 dated July 24, 2025, states that the pipes need to be NPS ½ inch (DN 15) or larger, and that the threaded ends need to comply with ANSI/ASME B1.20.1. Additionally, the pipes need to have a minimum pressure rating of 1206 kPa, with the materials and dimensions complying with the relevant ASTM or internationally recognized pipe standards.

ANSI/UL 852 has the following performance requirements for the pipes:

- Bending moment tests.
- Leakage test.
- Hydrostatic test.
- Vibration test.
- Fire test.
- Corrosion resistance ratio.

ANSI/UL 852 also requires hydrostatic tests to be conducted during manufacturing and production and the pipes to be legibly marked including a statement for pipes with wall thickness less than Schedule 40.

4.2. FM 1630

FM 1630 (June 2021) requires that pipes used in fire protection systems have a minimum rated working pressure of 1205 kPa, with materials and dimensions complying with ASTM A53/A53M, ASTM A135/A135M, and ASTM A795/A795M.

FM 1630 also specifies the minimum wall thickness for each pipe size from DN 15 to DN 300, which must be maintained after threading or cut grooving of the steel pipe.

Additional Requirements for Steel Pipes under FM 1630:

- Black steel pipes are permitted for use only in wet sprinkler systems.
- Galvanised pipes are permitted only in dry pipe systems, including preaction systems. These pipes must have an average minimum coating thickness of 0.55 kg/m² and be evaluated in accordance with ASTM A123/A123M.
- Steel pipes with internal coatings that allow installation in either wet or dry sprinkler systems will be evaluated on a case-by-case basis.
- Threaded end connections must comply with ANSI/ASME B1.20.1, BS 21, ISO 7-1, or other recognised national or international standards.
- Grooved and shouldered end connections must conform to the dimensional requirements of ANSI/AWWA C606 or other recognised standards, subject to case-by-case evaluation.
- Plain or welding ends must conform to a recognised national or international standard.

FM 1630 also includes marking requirements, including:

- Manufacturing source code
- Heat number or master coil reference number
- Date and shift code

Performance Requirements under FM 1630:

- Hydrostatic strength
- Bending moment resistance
- Rotational bending moment resistance
- Vibration resistance
- Marking durability
- Corrosion-resistant coatings
- Long-term corrosion testing
- Chemical compatibility testing for environmental stress cracking between plastic piping products and steel pipes with antimicrobial (AMC) and/or antibacterial coatings or films
- Corrosion evaluation testing

FM 1630 further requires manufacturers to demonstrate a quality control programme, and to conduct hydrostatic and flattening tests during manufacturing and production.

4.3. ASTM A53/A53M

ASTM A53/A53M covers only seamless or welded black or hot-dip galvanised steel pipes ranging from DN 6 to DN 650, and includes the following types and grades:

- Type F – Furnace-butt-welded, continuous welded, Grades A and B
- Type E – Electric-resistance-welded, Grades A and B
- Type S – Seamless, Grades A and B

ASTM A53/A53M pipes are intended for mechanical and pressure applications, and are also acceptable for general use in steam, water, gas, and air lines.

The standard outlines requirements for materials and manufacturing, chemical composition, and product analysis, as well as mechanical tests such as tension, bend, and flattening tests, which the steel pipes must undergo to meet the mechanical properties specified in ASTM A53/A53M.

Additional requirements include:

- Hydrostatic testing
- Non-destructive electric testing
- Permissible variations in weight and dimensions
- End finish specifications
- Workmanship, finish, and appearance
- Marking requirements

4.4. ASTM A135/A135M

ASTM A135/A135M is the standard specification for electric-resistance welded steel pipes. It covers two grades—Grade A and Grade B—of electric-resistance welded steel pipes ranging from DN 50 to DN 750 with nominal wall thicknesses up to 12.70 mm, and DN 20 to DN 125 pipes with wall thicknesses between 2.11 mm and 3.40 mm.

Pipes conforming to this standard are intended for conveying gas, vapour, water, or other liquids, with only Grade A pipes suitable for flanging and bending.

ASTM A135/A135M includes requirements for manufacture, chemical composition, product analysis, and mechanical properties. It also mandates that pipes undergo both a flattening test and a hydrostatic test.

Additional requirements include:

- Non-destructive examination
- Permissible variations in weight and dimensions
- Workmanship, finish, and appearance
- Marking

4.5. ASTM A795/A795M

ASTM A135/A135M is the standard specification black or hot-dipped zinc coated (galvanised), welded or seamless steel pipe for fire protection use ranging from DN 15 to DN 250 and includes the following types:

- Type F – Furnace-butt-welded, continuous welded
- Type E – Electric-resistance-welded
- Type S – Seamless

ASTM A795/A795M includes requirements for materials and manufacture, and chemical composition. It also mandates that pipes undergo a hydrotest, flattening test and a non-destructive electric test.

Additional requirements include:

- Coatings
- Permissible variations in weight and dimensions
- Workmanship, finish, and appearance
- Marking

5. Verification

5.1. Verification activities

Verification of conformity of the pipes, for the purposes of CSIRO's ActivFire® Scheme, requires the following activities detailed in Table 2.

Table 2 Activities required by this Technical Specification to evaluate the conformity of the steel pipes for the purposes of CSIRO's ActivFire® Scheme.

Activity	Description
1	Verification protocol selection.
2	Factory Production Control (FPC) audit of the manufacturing unit (MU) site of the steel pipes.
3	Verification that the steel pipes meet the requirements of either ASTM A53/53M, A135/135M or A795/795M.
4	Verification that the steel tubes meet the requirements of ANSI UL 852 and/or FM 1630.
5	Review of markings on the steel tubes, and marketing materials.
6	Identification of product limitations.

5.2. Activity 1

As part of this activity, CSIRO's ActivFire® Scheme shall devise a verification schedule that is tailored to the specific type of steel pipe being assessed by CSIRO's Fire Systems Laboratory. The applicant must notify CSIRO's ActivFire® Scheme of the particular standards to which they wish their steel pipes to be verified.

The applicant has the option to choose from the following standards for verification:

- ANSI/UL 852
- FM 1630

These standards shall be selected in conjunction with one of the following ASTM specifications:

- ASTM A53/A53M
- ASTM A135/A135M
- ASTM A795/A795M

Applicants are required to provide appropriate evidence demonstrating that their steel pipes conform to the nominated standards for verification. This documentation is essential to substantiate compliance with the selected verification standards, which may include ANSI/UL 852 or FM 1630, in conjunction with one of the specified ASTM specifications.

In addition to submitting evidence of conformity, a Factory Production Control (FPC) audit shall be undertaken. This audit will be conducted by a representative of CSIRO's ActivFire® Scheme, who will assess the manufacturing units (MU) to ensure that production processes and controls are in place and operating effectively.

5.3. Activity 2

To meet the requirements of Activity 2 of this Technical Specification, representatives of CSIRO's Fire Systems Laboratory and/or CSIRO's ActivFire® Scheme shall conduct an initial FPC audit of the manufacturing units (MU) in accordance with the audit activities are described in CSIRO ActivFire® Scheme document AF-D008 and the requirements described in below.

Table 3 Additional criteria and evidence of conformance required for the audit of a steel pipe manufacturing unit.

No	Activity	Requirements	Notes
1.	Identification of steel rolls	• All steel rolls in the store are identifiable and clearly labelled. The MU shall be able to identify the details of the steel roll through the label either physically or through a database. • Details of the steel row include, but are not limited to, the following: o Origin of the steel roll. o Date the steel row was manufactured. o Material composition of the steel row. o Thickness of the steel row. o Length of the steel row.	-
2.	A unique batch number is assigned to every manufactured steel pipes.	• System controls are in place to ensure that a unique batch number is assigned to every manufactured steel tube. • The unique batch number shall allow the PMU to at a minimum identify the following: o The steel roll used to manufacture the steel pipe. o Date the steel pipe was manufactured. o Size and class of the steel pipe.	-

No	Activity	Requirements	Notes
3.	Checking of quality of the steel pipes.	• The MU shall have a process in place to ensure that all steel tubes manufactured are tested and checked for quality in accordance with relevant recognised standard. • Any defective steel pipes shall be separated from the other steel pipes. • Non-destructive testing of seamless and welded steel tubes shall be in accordance with the relevant recognised standard.	The applicant shall provide CSIRO with details of which type of test is being conducted prior to the audit.
4.	A defined Quality Control (QC) test schedule exist for the steel pipes.	• The MU shall have a test schedule for the steel pipes to test the steel pipes mechanical properties (yield strength, tensile strength, elongation, and ductility) and galvanised coating (if applicable).	• Mechanical properties (yield strength, tensile strength, and elongation) of the steel tube shall be tested to relevant recognised standard by an accredited facility[1]. • Bending moment of the steel pipe shall be tested in accordance with relevant recognised standard. • Galvanised coating (if applicable) shall conform to a relevant recognised galvanised coating standard.
5.	QC test records	• The MU shall have records of all QC test results and have it available for references. • Good laboratory practice is always followed; white out is never used, a single line is always made through an incorrect data entry, the operator initials/signs an erroneous data entry.	-

[1] An accredited facility is a testing laboratory that holds accreditation to ISO 19705 and the test standard from an organisation recognised by an International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC-MRA) signatory.

No	Activity	Requirements	Notes
6.	Routine QC approval of product is controlled.	• The MU shall ensure that the routine QC approval of steel tubes is always followed. • Inspection of the QC test schedule demonstrates that all QC tests have test results recorded, that the test results are within minimum/maximum tolerances.	-
7.	Concessional QC approval of product is controlled.	• The MU shall ensure that the process for concessional approval of steel tubes is always followed. • Inspection of the QC test schedule demonstrates that all QC tests have test results recorded, that the out-of-spec test result has been approved by an authorised person.	
8.	Workmanship	• The MU shall ensure that the finished steel tubes are cleanly finished and free from defects. • The steel tube dimensions shall be within the tolerances specified in the relevant recognised standard. • The threads (if applicable) shall be clean, well cut and within the tolerances of AS ISO 7.1-2008 and AS ISO 7.2-2008 or an internationally recognised standard. • The ends of the steel pipe shall be cut cleanly and square with the axis of the pipe. • Steel pipe shall be straight within a 1:500 measured at the centre of the length. • Galvanised pipe (if applicable) shall have surfaces on which the coating is continuous, as smooth, and evenly distributed as possible and free from defects.	• Dimensions of the steel tube and the thread sizes of the steel tubes shall be verified back at CSIRO from samples selected during the audit. • Samples shall be selected and weighed using a calibrated scale for their mass and recorded by a CSIRO representative. • All other conformance requirements shall be inspected by a CSIRO representative visually.

5.4. Activity 3

To comply with Activity 3 of this Technical Specification, CSIRO's ActivFire® Scheme in its quotation shall provide a list of steel pipe samples the scheme requires for verification purposes. Suitable evidence of conformity to either ASTM A53/53M, A135/135M, or A795/795M shall be provided to CSIRO for verification purposes.

Please note that certificates issued by third party independent certification bodies are not considered suitable evidence of conformity for this activity.

5.5. Activity 4

To comply Activity 4 of this Technical Specification, evidence of conformity to either ANSI/UL852 and/or FM 1630 shall be provided to CSIRO for verification purposes.

Please note that certificates issued by third party independent certification bodies are not considered suitable evidence of conformity for this activity.

5.6. Activity 5

To meet the requirements of Activity 5 of this Technical Specification, images of the markings on the steel pipes shall be taken of the steel pipes during the audit process by a CSIRO representative. The applicant shall also provide photographical evidence of the markings of all the steel pipes. Markings on the steel pipes shall contain the following information:

- Manufacturer's name or trademark.
- Pipe size and nominal length.
- Schedule or model reference.
- Rated working pressure.
- Standard (including grade reference) to which the pipe was manufactured.
- Type of pipe (if applicable)
- Heat number or master coil reference number.
- Production test reference.
- The certification agency's mark of conformity.
- The words "Corrosion Resistance Ratio" or CRR" along with the appropriate value associated with the pipe and size for threaded steel pipe with a wall thickness less than Schedule 40 steel pipe and unthreaded steel pipe with a wall thickness less than Schedule 10 (applicable for ANSI/UL 852 pipes only).
- "CAUTION: IMPROPER THREADING MAY LEAD TO LEAKING. CHECK ALL THREADS WITH ANSI B1.20.1 THREAD GAUGE." Or other equivalent thread reference for steel pipes with a wall thickness less than Schedule 40 that is intended to be threaded.

CSIRO will also review all datasheets and marketing material that intends to have the ActivFire® mark (including websites), ensuring that the marketing material and datasheets contains accurate information of the product.

5.7. Activity 6

CSIRO's Fire System Laboratory shall identify any product limitation from their verification activities including the following:

- Black steel pipes are permitted for use only in wet sprinkler systems.
- Galvanised pipes are permitted only in dry pipe systems, including preaction systems (if applicable).
- Suitability of the pipes to be installed above or below ground in accordance with AS 4118.2.1-1995 and / or AS 2419.1:2021.

5.8. Suitability of external evidence

Assessment of the suitability of external agencies (laboratory) evidence shall be conducted in accordance with the CSIRO Recognition Framework.

Evidence of conformity, in the form of endorsed test reports written in English, are required to be submitted in full and shall be provided by a National Association of Testing Authorities (NATA) ISO 17025 accredited laboratory and the relevant test standard, or as agreed with CSIRO.

Where test reports were originally produced in a language other than English, suitable translations may be supplied in addition. Submitted external test reports must provide sufficient detail to describe the product being evaluated in full and in detail and establish that an evaluation schedule was designed and applied to each component submitted to the external agency.

External evidence can only be accepted where verification between the product submitted for verification and the specimens in the endorsed test report is considered a critical requirement. Where external reports do not provide sufficient product identification, evaluation activities to specified requirements may be required.

5.9. Reporting

The verification of conformity report shall include the following information:

a. A statement of conformity with reference to CSIRO Technical Specification TS-027 and unambiguous designation that the product has been evaluated in accordance with this technical specification.
b. A description of the product including photographs of the product.
c. Limitation of the product.
d. List of documentation used for the verification of conformity including the document ID, version number, and issue date.
e. All other information in accordance with the reporting requirements of AS ISO/IEC 17025:2018.

6. Ongoing Verification of Conformity

6.1. Ongoing verification of conformity activities

To maintain ongoing certification with CSIRO's ActivFire® Scheme, the steel pipe shall be subject to a post-certification surveillance activity described in Table 5.

Table 4 Activities required to demonstrate ongoing conformity of the steel tubes.

Activity	Description	Notes
1	Factory Production Control (FPC) audit of the Manufacturing Unit (PMU) every two years from the issue date of the Certificate of Conformity.	• Details of the audit activities are described in CSIRO ActivFire® Scheme document AF-D008 and Activity 1 of Section 4. • If the Registrant has multiple Certified steel tube ranges with the Scheme that are manufactured at the same PMU, the Scheme shall work with the Registrant to conduct the PMU audit within the same period for the other Certified steel tubes products.
2	Verification of steel pipe sizes	• Sizes of selected samples of the steel pipes shall be checked and verified in accordance relevant standard the steel pipes are certified to during the FPC audit.
3	Verification of the steel tube material properties	• Test reports shall be provided to CSIRO for the selected samples of steel pipes during the FPC audit. • The properties shall be in accordance with the requirements of Activity 2 of Section 4.

Document Review

Version: 1

Issued date: 30-Sep-2025

Authorised by: Kai Loh

Document version no:	Issued date:	Change description:
1	30-Sep-2025	• Initial issue