VERMIDUCT

SPECIFICATION

FIRE PROTECTION FOR AIR HANDLING DUCTS

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Specification

1.0 General

1.1 Scope

This specification consists of all Labour, Materials, Equipment and Services necessary to complete the supply and installation of all the required spray applied fireproofing of air handling ductwork as shown in the drawings and specified hereinafter, including but not limited to the following:

(i) Spray-on fireproofing of air handling ductwork
(ii) Protective coat over fireproofing in specific areas
(iii) Preparation of surfaces
(iv) Maintenance, inspection and installation of hardware for air handling ductwork

This specification is to be read in conjunction with drawings and documents referenced in the tender package.

1.2 Applicable Standards

The following Standards may be referred to in this specification:

BS 476.24 ISO 6944	Fire Tests on building materials and structures. Method for determination of the fire resistance of ventilation ducts;
AS 1530.3	Test for early fire hazard properties of materials; and
BS 476.4	Fire Test Building Materials and Structures – Non-combustibility Test for Materials;
AS 3784	Coatings for fire protection of building elements.
AS 2592	Gypsum plaster for building purposes
AS 1315	Portland cement
AS 4100	Steel Structures
BS 5588-9	Fire Precautions in the Design, construction and use of buildings. Code of practice for ventilation and air-conditioning ductwork.
AS 1668	The use of mechanical ventilation and air-conditioning in buildings - Part 1: Fire and Smoke control
AS 1668	The use of mechanical ventilation and air-conditioning in buildings - Part 2: Mechanical ventilation for acceptable indoor-air quality
AS 1682	Fire Dampers - Part 1: Specification
AS 1682	Fire Dampers - Part 2: Installation
AS 1851	Maintenance of Fire Protection Equipment Part 5: Automatic Smoke/Heat Venting Systems
AS 4254	Draft Australian Standard Ductwork for Air Handling Systems in Building
AS 3679	Structural Steel
AS3679	Structural Steel Part 1: Hot rolled bars and sections
UL 181	Factory made air ducts and air connectors (UL)
ISO 9002	Quality systems. Model for quality assurance in production, installation and servicing

All material and installation processes and Air Handling Duct system must comply with the applicable provision of the current edition of the above listed standards.

1.3 Authorities and Legislation

All materials and workmanship shall comply in all respects with the provisions and the requirements set out by:

1) The approved Independent Certifying Authority (such as Lloyds, DNV, Bureau Veritas, Consultant)
2) Government body or Building Code (…Insert Code Name)
3) Other Regulators under the jurisdiction of Maritime bodies, professional associations etc

The contractor shall have responsibility to perform all the required tests and make all the required submissions in order to obtain all the necessary approvals.

1.4 Submissions

The following submissions are required:

(i) Name of Material Manufacturer including a full description of the proposed fireproofing system.
(ii) Manufacturer's Product Information including design and Installation specification and test data instructions.
(iii) Proposed material thicknesses for each type of application.
(iv) Proposed Access Panels, Resilient Joint and Inspection Grills System.
(v) Performance Testing:

The following test results for all test procedures shall be submitted with the tender:

(a) AS1530 Part 3:
Ignitability Index, Spread of Flame Index, Heat evolved Index, Smoke Developed Index

(b) AS1530 Part 4:
Fire Resistance Tests of Elements of Building and Construction

(c) BS 476:24:
Fire tests on building materials and structures. Method for determination of ventilation ducts

(d) ASTM C518-02
Standard Test method for steady-state heat flux measurement and thermal transmission properties, by means of the heat flow meter apparatus.

(e) AS 2185: Appendix A2
Surface Indentation Test

(f) AS 1276
Method for determination of sound transmission class and noise isolation class of building partitions.

A current Certificate of Registration from a JAS-ANZ approved third party accrediting body certifying that the material manufacturer has a Quality Management System in place which complies with AS/NZS ISO 9002:2000.

1.5 Applicator Qualifications

The Applicator shall be Licensed or otherwise approved by the manufacturer of the fireproofing material. The Applicator(s) shall be familiar with the latest Application Manuals as issued by the manufacturer.

1.6 Warranties

The Applicator shall undertake and assume total responsibility for the spray fireproofing to the substrates.

The Applicator shall repair or replace sprayed-on fireproofing which has excessively cracked or dusted, flaked, peeled away from the substrate, or has otherwise failed to fulfil the performance criteria, due to defective materials and/or workmanship.

1.7 Mock-Up

Spec-Note: May include this Article for Large projects only.

1) Apply sample section of […] m² in size to representative substrates on site.
2) Comply with project requirements as to thickness, density of application, fire rating, and finish Texture.
3) Allow for examination of installation within [one] […] hour of application to determine variance due to shrinkage, temperature, and humidity.
4) Where shrinkage and cracking are evident, adjust water/mixture ratio and method of application as necessary. Refer to Manufacturer's notes on the subject.

5) If accepted, mock-up will demonstrate minimum standards for the work. Mock-up may [not] remain as part of the work.

Spec-Note: Time duration for examination should be determined by expected shrinkage, temperature, and humidity conditions during drying time. Refer to manufacturer for technical assistance.

1.8 Testing and Inspection by Client

1) The Client [will] [may] appoint and pay for services of a Testing Agency to verify compliance with specified requirements.
2) The Applicator shall correct all deficient spray work and pay for further inspection and testing required to verify compliance with specified requirements.

2.0 Materials

2.1 Description

The fireproofing system shall be a surface-adhered spray applied material, to be proposed by the system manufacturer, complying with the fire resistance ratings as required by the Building Authorities and Regulations governing such applications and equal in all respects to 'Vermiduct' as manufactured by L & A Fazzini Manufacturing Pty Ltd.

Where applicable, a veneer protective coat equal in respects to Vermitex '7', or alternatively a Silicate based compound as manufactured/distributed by L & A Fazzini Manufacturing Pty Ltd, shall be spray-applied over 'Vermiduct' in accordance with manufacturer's specification and recommendation, to achieve a total cover to areas as specified.

All materials to contain no asbestos or toxic substances.

2.2 Performance Criteria

The fireproofing material shall comply with the following requirements and be manufactured by a Company which has a current Quality Management System in place in accordance with AS/NZS ISO 9002:2000.

- Early Fire Hazard Properties (AS1530, Part 3):

  a) Ignitability Index: 0
  b) Spread of Flame Index: 0
  c) Heat Developed Index: 0
  d) Smoke Developed Index: 1 or less

- Density (AS3784):

  The fireproofing material should not have, in normal application, a dry density of 260-300kg/m^3.

- Material Thickness:

  The thickness of the fireproofing material shall be determined from the manufacturer's schedules for the various fire resistance periods and element sizes.

  The schedules shall have been derived from the time-temperature data obtained from the standard fire test series conducted by the CSIRO in accordance with AS1530; Part 4 or BS 476 Part 20. For Steel elements the results shall have been subjected to a least-square regression analysis using the model specified within Section 12 of the Australian Steel Structures Code, AS 4100-1990. Thickness data submitted shall have certification from the CSIRO that it conforms to Australian and British Standards (Refer to FCO 2233):

  'Vermiduct' thickness for Vertical and Horizontal Ducts with Internal or External Fire Exposure

Fire Resistance [Stability / Integrity / Insulation (Minutes)]	60/60/60	120/120/120	180/180/180	240/240/240
Sheetmetal Ducts to 1600 x 1600mm	12 mm	20 mm	45 mm	55 mm
Sheetmetal Ducts from 1600 x 1600mm to 2400 x 2400 mm	16 mm	25 mm	50 mm	55 mm
From 1600 up to 4800 x 3600mm	16 mm	25 mm	55 mm	65 mm

Note:
(1) The above data is extracted from CSIRO Assessment FCO 2233;
(2) *IMPORTANT* The stated Thickness allows for compliance with the Insulation Criteria as well (no additional Insulation is required for Fire Resistance!)

No other form of documentary evidence will be accepted as proof of conformance.

2.3 Performance Criteria

- Access Panels:

  All required access points and/or panels pre-installed over the metal ducting component shall be Fire Rated by using only an approved type Fire Rated Access Panel System as tested by the Manufacturer in accordance with BS476 - Part 24. Dimensions of openings shall not exceed those specified by the manufacturer.

- Expansion/Vibration Control Joints:

  Where expansion joints and/or vibration control joints require a Fire Resistance Level, use shall only be made of approved type joint systems which have been tested by the system manufacturer in Accordance with AS 1530, Part 4. Documentary evidence substantiating test results and compliance shall be submitted.

- Inspection Grilles:

  All services (Actuators, Sprinkler Penetrations, Smoke/Heat Detectors, Thermostats, Registers, Moving Components etc.) requiring periodical maintenance and/or servicing shall be enclosed in approved type Inspection Box fully tested to comply with the requirements of AS 1530, Part 4 and specified by the manufacturer of the Fireproofing material.

  No other form of documentary evidence will be accepted as proof of conformance.

2.4 Design Criteria

Metal ducting - all materials, duct sizes, support systems and suspension rod centres are to be in accordance with the fireproofing material manufacturer's written specification and shall be approved by the mechanical consultant and verified on site by the mechanical contractor.

Fire rating spray fireproofing shall be applied to meet the requirements of the Authority [..Insert name] or Building Code of [……. insert Country], on all exposed surfaces to provide the required fire resistance level (FRL) as set out below.

Spec-Note: Example of Design Criteria Table

PROJECT: THE GRAND HOTEL			
Area	Element	FRL (Hours)	Protection Required
Ground Floor	Smoke Exhaust System	4	Nil
Level 2	Stair Pressurisation	3	Nil

2.5 Handling, Storage, and Protection

All fireproofing materials shall be delivered in original unopened packages bearing the name of the manufacturer, the brand together with proper approvals and instructions for its use on site.

The material shall be kept dry until ready for use. The material shall be kept off the ground under cover and away from sweating walls and other damp surfaces. All bags that have been exposed to water before use shall be discarded. Stock of material is to be rotated and used prior to its expiration date.

3.0 Installation of Fireproofing Material and Related Hardware

3.1 Inspection

Prior to the application of the fireproofing material, an inspection shall be carried out to ensure that all surfaces and the work environment are acceptable for work to commence.

Ensure that all other attachments, such as clips, sleeves, angles etc. have been installed by others as required prior to the application of the Fireproofing materials.

Non fire-rated ducts, piping, conduit, equipment or other services that interfere with the uniform application of the fireproofing material shall be positioned after the application of the sprayed fireproofing.

All structural features, such as duct spans, reinforcement, suspension systems, duct joints etc are by the mechanical contractor and in full compliance with the manufacturer's tested method.

3.2 Preparation

- General:

  All surfaces to receive sprayed fireproofing shall be free of oil, grease, paints and primers, loose mill scale, dirt and other foreign substances which may impair proper adhesion of the fireproofing to the substrate. Where necessary, the cleaning of surfaces shall be the responsibility of the General Contractor, as outlined in other parts of the relevant specifications.

- Duct Suspension System:

  All of the following details shall be in accordance with the relevant specification tables as set out in the Ductwork Construction Standards Table 1, of 29th December 2003 as published by the manufacturer of the fireproofing material.

- Work Sequence:

  Where the sprayed-on fireproofing material will be subject to heavy traffic or consequential damage by other trades; such as around temporary construction openings, the fireproofing works shall be scheduled at the final phase of the construction program.

  Where this is inappropriate, measures shall be taken to minimise damage by physically protecting the fireproofing materials during the course of construction.

3.3 Application of Fireproofing material

Installation shall only be carried out by an approved applicator with experience in the spraying of contoured fireproofing materials. Exercise care to instate material completely into inverted corners, and to build up work to full thickness at projecting corners.

Application shall be made by trowel or other approved methods in confined areas, such as on surfaces close to walls or other obstructions.

Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available, or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work. Where specified any protective coatings shall be applied over fireproofing strictly in accordance with the manufacturer's recommendations and instructions.

Protective Coatings shall be applied over fireproofing strictly in accordance with the manufacturer's recommendations and instructions.

Provide masking protection to immediate areas as much as possible to limit over spray. Remove excess spray and spillage promptly.

Where sprayed fireproofing is damaged by other trades it shall be Repaired and Patched under this section and paid for by the trade(s) causing the damage.

3.4 Installation of Related Hardware

All access panels, expansion/vibration control joints and inspection grilles shall be installed strictly in accordance with the manufacturer's written specifications.

3.5 Precautions

No fireproofing shall be applied prior to the placement of concrete has been completed. Temperature and enclosure conditions shall be as required by the fireproofing manufacturer.

An air and substrate temperature of not less than 4°C shall be maintained for a period of 24 hours before and after application of the fireproofing.

Provisions shall be made for ventilation (but not excessively) to properly dry the fireproofing after application. In enclosed areas lacking natural ventilation, air circulation and ventilation may have to be provided by the Main Contractor. Refer to Section 10 & 11 for advice on Dryouts surface shrinkage.

3.6 Cleanup

Upon completion of the works, remove from site all equipment and legally dispose off all unused packaging, materials, containers, equipment, and the like. Remove all excess material and over spray from walls and other adjacent surfaces that may have received over spray.

All exposed wall and floor areas shall be left in a broom-clean condition.

4.0 Quality Assurance

Before commencement of any work the Client's Representative shall be presented with a copy of the current Certificate of Registration from a JAS-ANZ approved third party accrediting body certifying that the material manufacturer has a Quality Management System in place which complies with AS/NZS ISO 9002.

The architect may designate a qualified Project Quality Inspector who shall have the duties listed below and adhering to the guidelines set out in "Inspection Procedure for Field Applied Sprayed Fire Protection Materials":

- Check all conditions of application and approve same prior to commencing application of any area.
- Resolve, with the Main Contractor, any difficult application conditions, such as where obstructions prevent easy access to air handling equipment.
- Monitor the application of the fireproofing to ensure compliance with all requirements and Works Method Statement.
- Check all fireproofing progressively for compliance with thickness requirements.
- Maintain a daily log of all quality assurance inspections, noting any defects and corrective work.
- Submit a quality assurance inspection report at the completion of works, or section as required, attaching copies of the daily log.

Rejections:

Defective material or workmanship shall be rejected. All rejected work or materials shall be repaired or replaced by the Applicator at their own expense and to the satisfaction of the Main Contractor. No extension of time shall be granted for any delays caused by rejection.

All reports shall be inspected by an authorised person prior to a formal rejection letter being issued.