AWTA PRODUCT TESTING

Test Information Sheet

Ducting (AS/NZS 4254)

The Australian National Construction Code contains the deemed to satisfy requirements for fire in Volume 1 Specification S7. This requires flexible and rigid ducting used in air handling systems must comply with the fire hazard properties set out in AS 4254 Part 1 & Part 2.

AS 4254 Ductwork for air-handling systems in buildings has two parts:
Part 1 (2021) – Flexible Ducting
Part 2 (2012) – Rigid Ducting

UL 181.11-2013 Ducting – Flammability test

Six samples are tested, mounted as follows:

- Two in the horizontal position
- Two in the vertical position
- Two on a 45 degree angle

A flame is applied to the external face of the ducting in all positions for 60 seconds then withdrawn. The specimen is then observed for any flaming or glowing. If flaming or glowing ceases in 60 seconds or less, the flame is applied again in the same position for 60 seconds. After withdrawal of the flame, the duration of the flaming or glowing is noted.

When particles drop from the samples that are oriented horizontally and at 45-degrees during the exterior exposure tests, these particles are allowed to fall onto a horizontal plane covered with a layer of untreated surgical cotton. Any ignition of the cotton is recorded and reported.

Following exposure of the exterior surface of the first three samples, similar tests are conducted on the remaining three samples of the set by applying flame to the inside surface.

Requirements

a) The duration of flaming or glowing of any sample after withdrawal of the test flame is not to exceed 60 seconds;
b) flaming or glowing is not to travel to the end of the sample farthest from the point of application of the test flame; and
c) particles dropped from the exterior surface of the sample during the vertical and 45-degree exterior exposures are not to ignite the surgical cotton.

Delivery Address	Further Information
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AS/NZS 1530.3-1999 Simultaneous determination of ignitability, flame propagation, heat release and smoke release (Early Fire Hazard Properties)

A vertically mounted specimen is brought to a position 850mm in front of a radiant. At 30 second intervals the specimen is moved closer to the heat source in a series of steps. If ignition has not occurred after 12.5 minutes the specimen remains 175mm from the panel for a further 7.5 minutes (i.e. a maximum total exposure time of 20 minutes) or until ignition occurs whichever is sooner.

During exposure, a small gas pilot flame is held 15mm in front of the specimen. This pilot flame will ignite combustible gases given off but not the surface of the specimen. When ignition occurs the forward movement is stopped. The mean time to ignite for all specimens, subtracted from 20, determines the IGNITABILITY INDEX.

During exposure a radiometer is used to measure the heat radiated from the specimen. There is a steady increase as the specimen moves towards the heat source, followed by a rapid increase at ignition. The recorded radiometer output is later analysed to determine;

a) the rate of rise after ignition by measuring the time taken for the radiation to rise by 1.4 kW/m^2 from its value prior to ignition, and

b) the area under the radiation curve for the next two minutes after ignition which is converted to a heat evolved value in kJ/m^2.

The results of all specimens tested are averaged and the SPREAD OF FLAME INDEX and HEAT EVOLVED INDEX are determined from tables given in the standard.

A light source and photocell located on the flue above the test continuously monitors the transmission of light through the air in the flue. Ignition and non-ignition specimens are separately analysed to determine the maximum optical density per metre recorded over any one-minute period during the test. The mean optical density per metre for the specimens determines the SMOKE DEVELOPED INDEX. The scale is logarithmic with each index number equivalent to double the mean optical density of the index number below it.

Three supplementary tests are necessary if the results for the first six specimens fall outside prescribed limits of variability.

REQUIREMENTS
The maximum indices specified in the standards are:

	AS 4254:1-2021, Clause 5.3.3 (a)	AS 4254.2:2012, Clause 2.1.2 (a)
Ignitability Index	-	-
Spread of Flame Index	0	0
Heat Evolved Index	-	-
Smoke Developed Index	3	3

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AS 4254.1: 2021 Ductwork for air handling systems in buildings - Flexible Ducting

AS 4254.1 Clause	Standard	Test	Ducting	AWTA Test Code	Estimated Working days
5.3.2 (a)	UL 181.13	Mould growth and humidity	✓	T18E	65
5.3.2 (b)	UL 181.14	Temperature	✓	T18F	15
5.3.2 (c)	UL 181.15	Puncture	✓	T18G	15
5.3.2 (d)	UL 181.16	Static Load	✓	T18H	15
5.3.2 (e)	UL 181.17	Impact	✓	T18I	15
5.3.2 (f)	UL 181.19	Pressure	✓	T18J	15
5.3.2 (g)	UL 181.20	Collapse	✓	T18K	15
5.3.2 (h)	UL 181.21	Tension	✓	T18L	15
5.3.3 (a)	AS/NZS 1530. 3	Early Fire Hazard	✓	T18B *note 2*	10
5.3.3 (b)	UL 181.11	UL 181 Burn Test	✓	T18D *note3*	10
5.6	AS 4254.1, App B	Thermal Insulation (R value)	✓	T19FD *note 5*	30-50

AS 4254.2: 2012 Ductwork for air handling systems in buildings - Rigid Ducting

AS 4254.2 Clause	Standard	Test	Insulated ducting	AWTA Test Code	Estimated Working days
2.4.2 (a)	UL 181.13	Mould growth and humidity	✓	T18E	65
2.4.3 (a)	AS/NZS 1530.	Early Fire Hazard	✓	T18B *note 2*	20
2.4.3 (b)	UL 181.11	UL 181 Burn Test	✓	T18D *note3*	10
2.6	AS/NZS 4859.1: 2018	Thermal Insulation (R value)	✓	T19F10 *note5*	30-50

Notes:

1. *The standard requires that all testing be conducted on 300mm diameter ducting as an assembly.*
2. *The AS/NZS 1530.3 test shall be conducted on the assembled duct.*
3. *The UL 181 burning test shall be conducted on the duct system i.e. the assembled final product.*
4. *Where the duct core is tested and passes the pressure, collapse, impact and tension tests without insulation material, it does not need to be re-tested when used in insulated duct as an identical core construction.*
5. *Thermal Insulation (R Value) is required for insulated ducting only.*

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SAMPLE REQUIRED

Duct Burn Test T18D – UL 181, Method 11	• *Six lengths - 914mm x 300mm diameter of insulated duct, plus* • *Six lengths- 914mm x 300mm diameter of internal core (if sold separately)*
Early Fire Hazards Test T18B – AS/NZS 1530.3	• *Sufficient insulated duct material to allow 10 samples to be formed by flattening of the duct, each specimen 600mm x 450mm.* • *Sufficient core material to allow 10 specimens to be formed by flattening of the duct, each specimen 600mm x 450mm, when sold as separate unit.*
UL Physical tests	
UL 181, Method 13-21 (less test 18)	• *7 x 6m lengths of assembled duct*
Thermal tests	
T19FD AS 254.1, App. B	• *Flexible: Three (3) complete ducts, submitted in standard compressed packaging*
T19F10 – AS/NZS 4859.1	• *Rigid: Ten specimens, 300mm x 300mm*

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