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PAPER No. 3

FIRE & SMOKE DAMPERS CONSTRUCTION & OPERATION

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BACKGROUND

- Most non-compliances in assessment of Essential HVAC systems are due to incorrect Fire Damper installations.
- AS 1682.1 & 2-2015, the Australian Standards on Fire & Smoke Dampers, were revised, published in 2015 and are called up by AS/NZS 1668.1-2015.

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WHAT FIRE & SMOKE DAMPERS MUST DO

- Fire & Smoke Dampers **MUST** Permit unrestricted airflow during normal operation.
- Fire Dampers **MUST** Close duct openings during fire, to preserve the integrity of the fire compartment.

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WHAT FIRE & SMOKE DAMPERS MUST DO

- Smoke Dampers **MUST:**
  - **CLOSE,** **or**
  - ***KEEP OPEN***

  duct openings during fire, to preserve the integrity of the fire or smoke compartment as appropriate to the smoke management intent.

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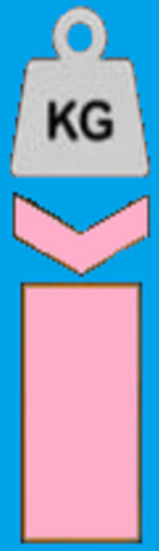
Fire Resistance Level

FRL 90/90/90



Structural Adequacy

The ability of the building element to support the weight of adjacent building elements

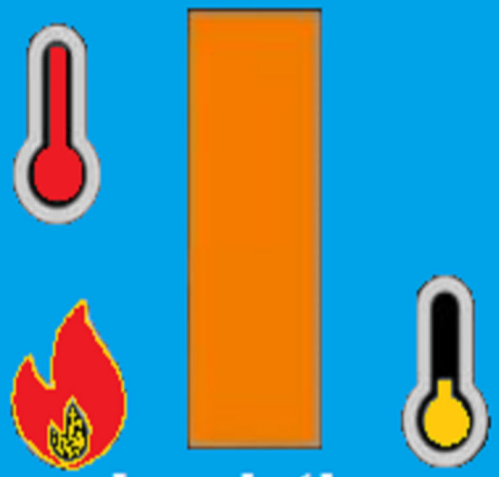
i.e A masonry wall supporting a concrete floor slab above

Not a Fire Damper

Integrity

The ability of an element or device which prevents the passage of flames and hot gasses

i.e. A Damper which shall close on fire and stop the passage of all products of combustion



Insulation

The ability of an element to resist heat transfer from the exposed face to the unexposed face

i.e. Some fire dampers may have insulation (intumescent, ceiling, etc.) or the duct shall have fire wrapping or fire rated encapsulation

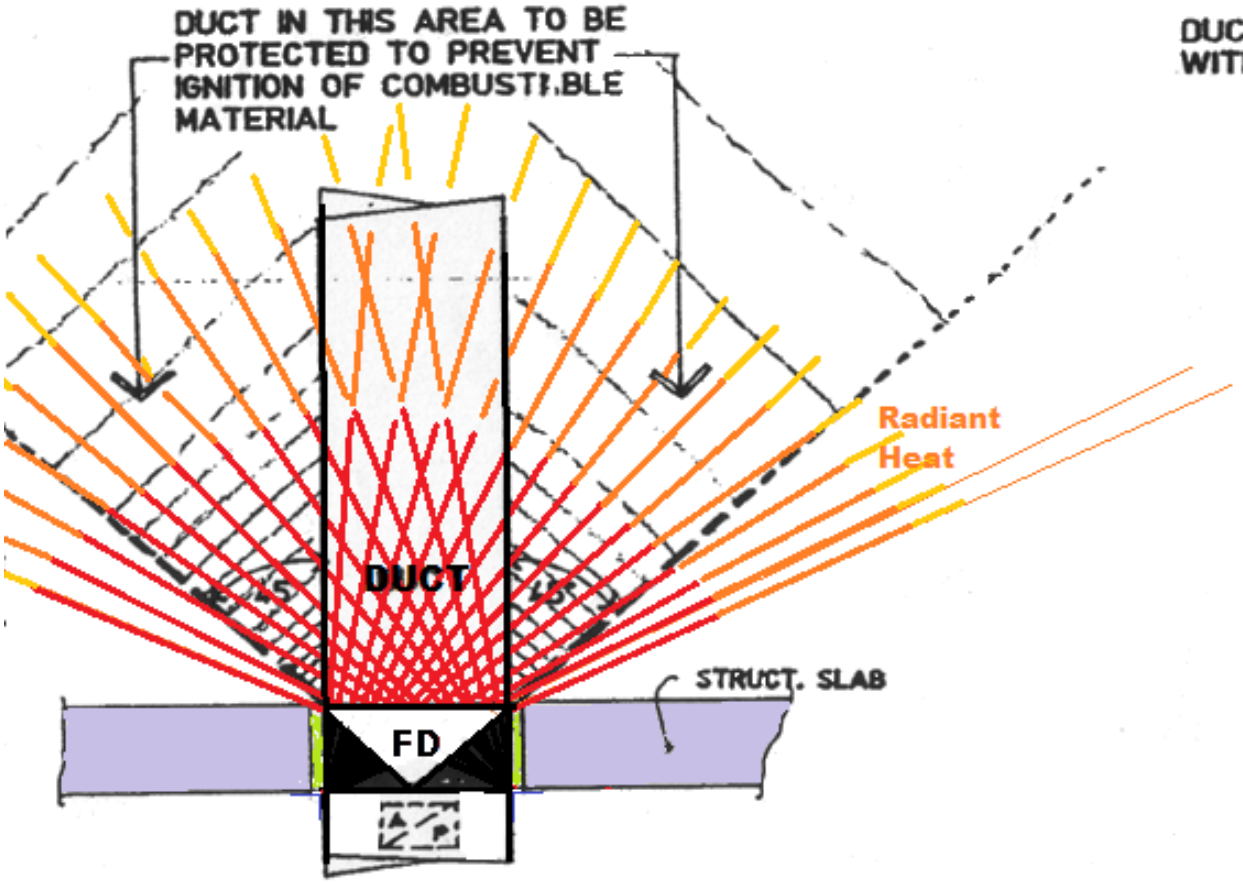
TYPES OF DAMPERS

FIRE DAMPERS

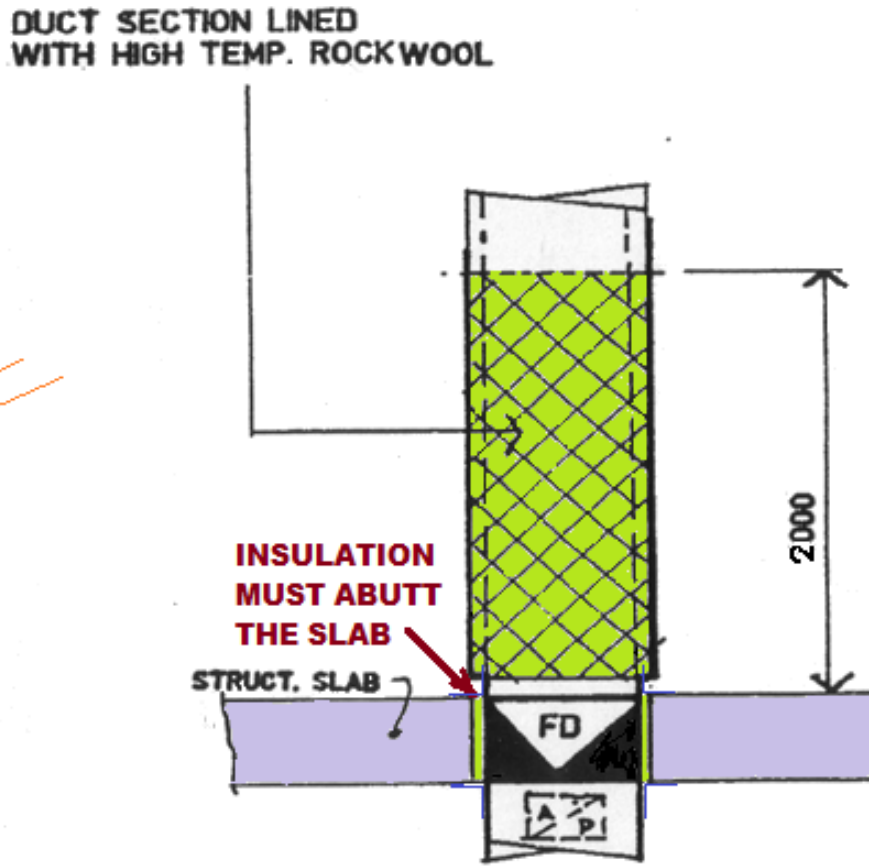
- Close on thermal activation to protect the FRL of the compartment boundaries

  (FRL = Structural Adequacy, Integrity & Insulation)

- **NONE** provide **Structural Adequacy**
- **ALL** types maintain the **Integrity** of the barrier
- Some types **MAY** provide **Insulation**



BARE DUCT

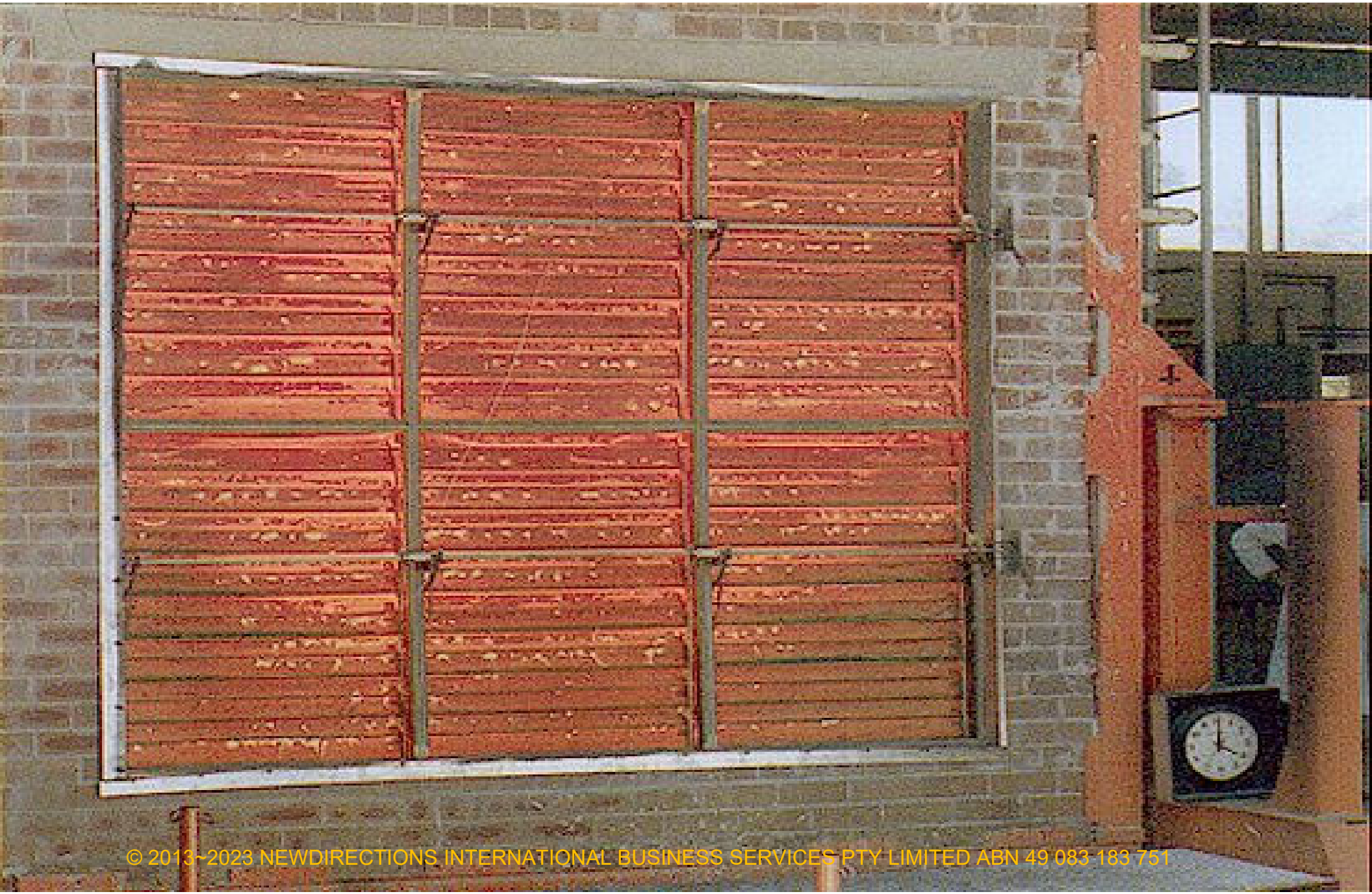


INSULATED DUCT

HORIZONTAL (SLAB MOUNTED) FIRE DAMPER INSTALLATION

From original design by:
Obrart & Co + Professional Engineering Solutions P/L
Revised updated and copywrited by:
NEW DIRECTIONS IN BUILDING SERVICES / FIRE ASSESS
ABN 49 083 183 751 PO Box 115 Boolaroo NSW 2284

Courtesy of: BULLOCK



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Courtesy of: BLENDAIR www.rileyair.com.au

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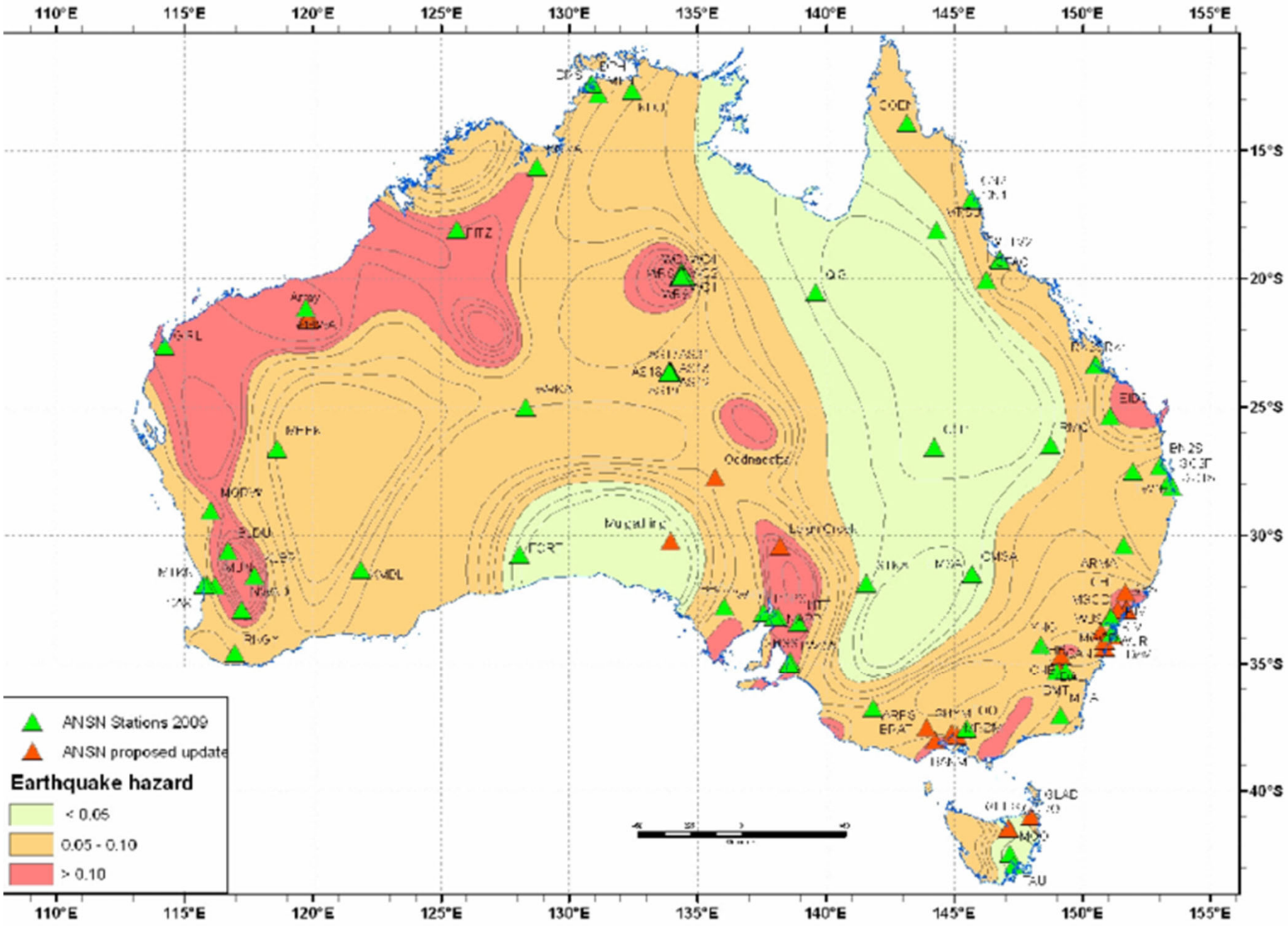

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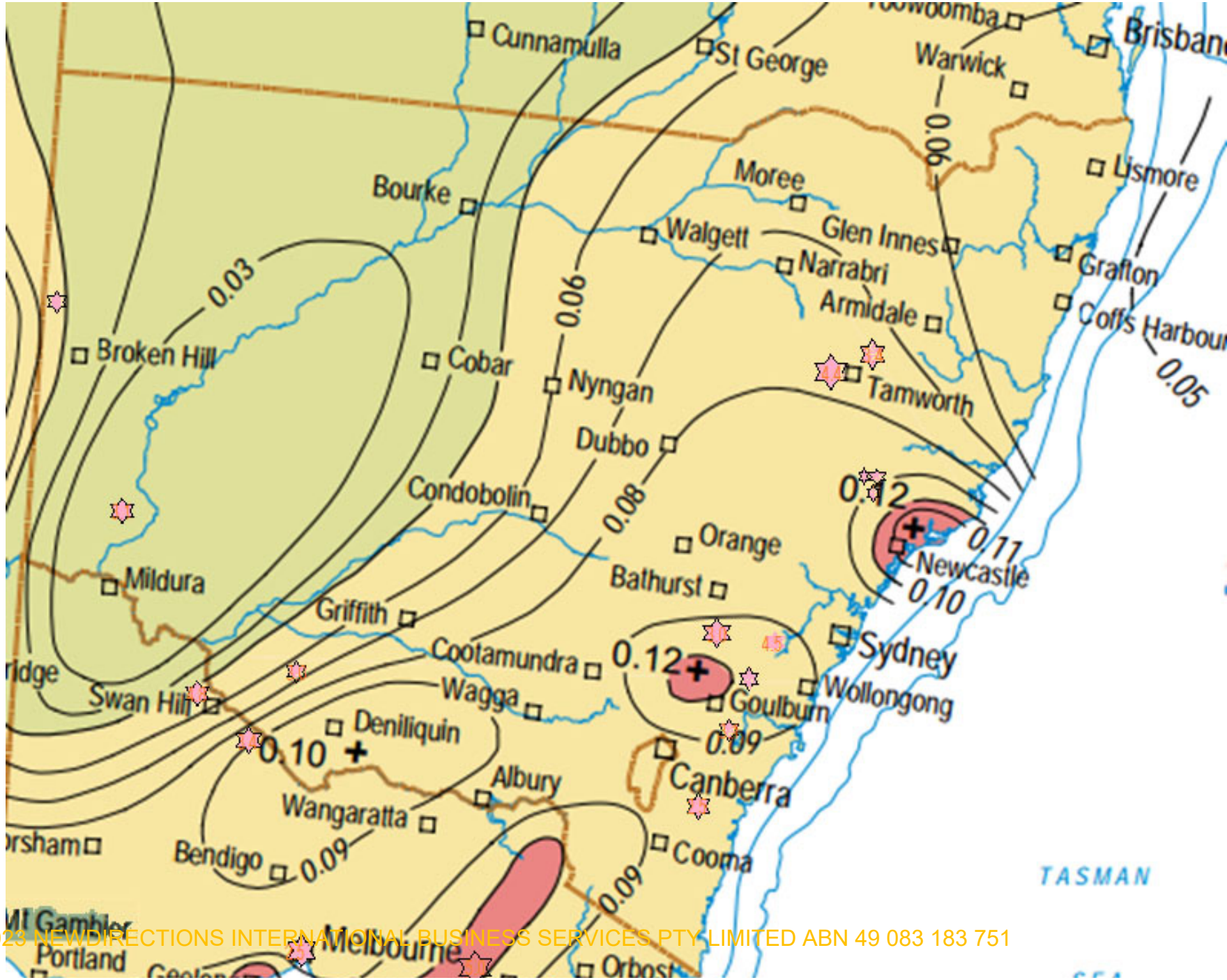
AS1170.4 Seismic Risk consideration



TYPES OF DAMPERS

SMOKE DAMPERS

- Required in Hospitals; or Apartments with one A/C Unit serving several Sole Occupancy Units
- Must close on remote signal to protect the Integrity of the smoke compartment
- Built & installed as fire dampers except:
  - They must have **tip seals**
  - Must be able to be closed by **remote** signal
  - Retaining clips **may** be omitted

TYPES OF DAMPERS

AIR CONTROL DAMPERS

- A "special" name for motorized dampers used in smoke control systems, but not designated as Smoke Dampers
- Must operate on remote signal to direct the Pressurization or Exhaust airflows
- Are conventional motorized dampers; except in Smoke Spill Systems, where they must "*resist high temperatures*" e.g. 200°C for 2 hrs
  (in a sprinkler protected building and 300°C for 30-mins in an unsprinklered building or part).

TYPES OF DAMPERS

SUB DUCTS

- Sub ducts provide a path for pressure relief and are used in buildings without zone smoke control. It is essential that the extract fan remain operating in fire mode.
- In many older buildings, we are seeing them replaced or supplemented with air control dampers associated with zone smoke control as it is introduced.

TYPES OF FIRE DAMPERS

- Mechanical Fire Dampers
- Intumescent Fire Dampers

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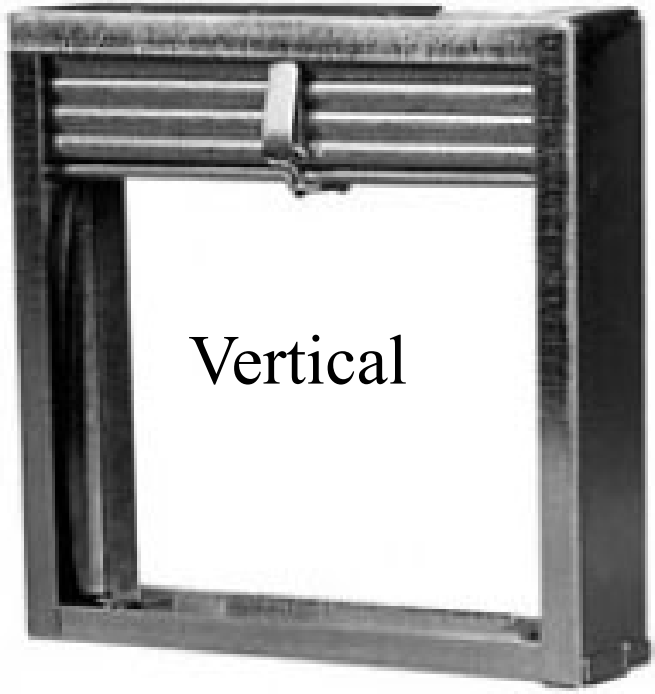
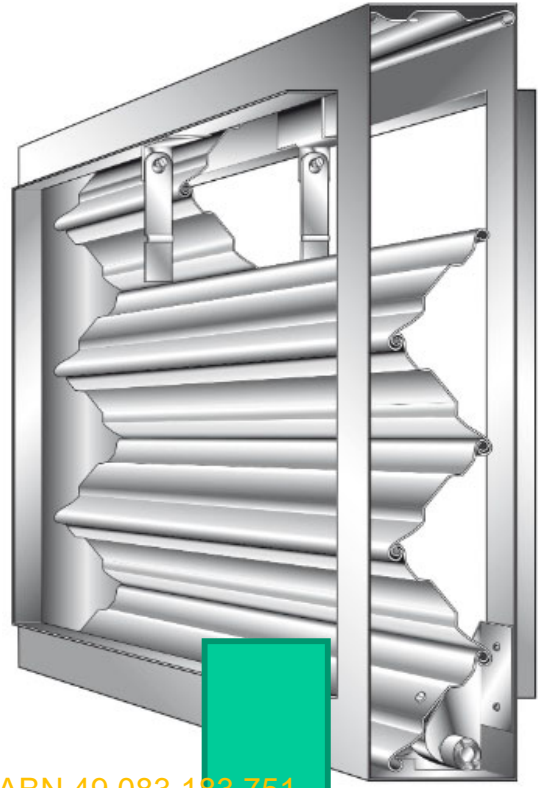


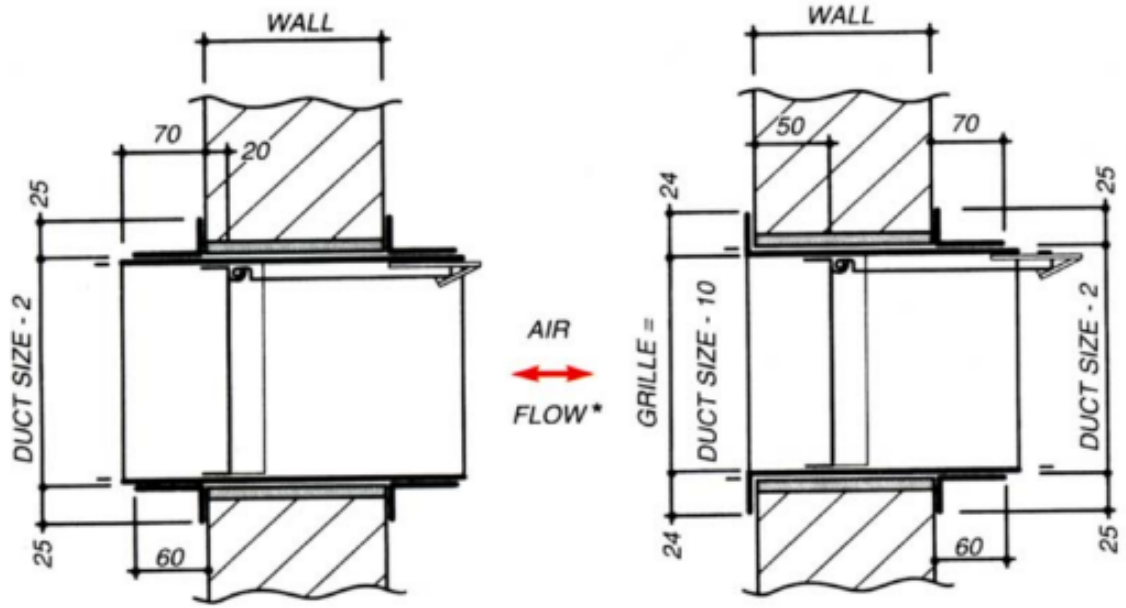
Vertical

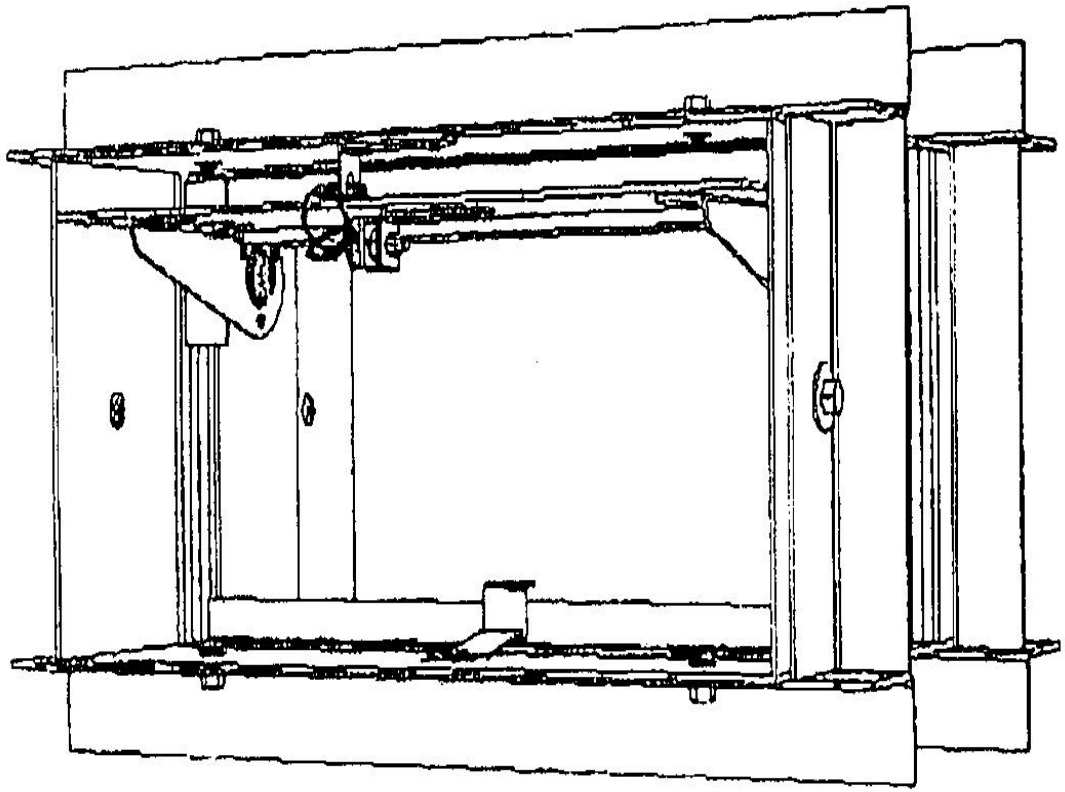


Curtain fire Dampers

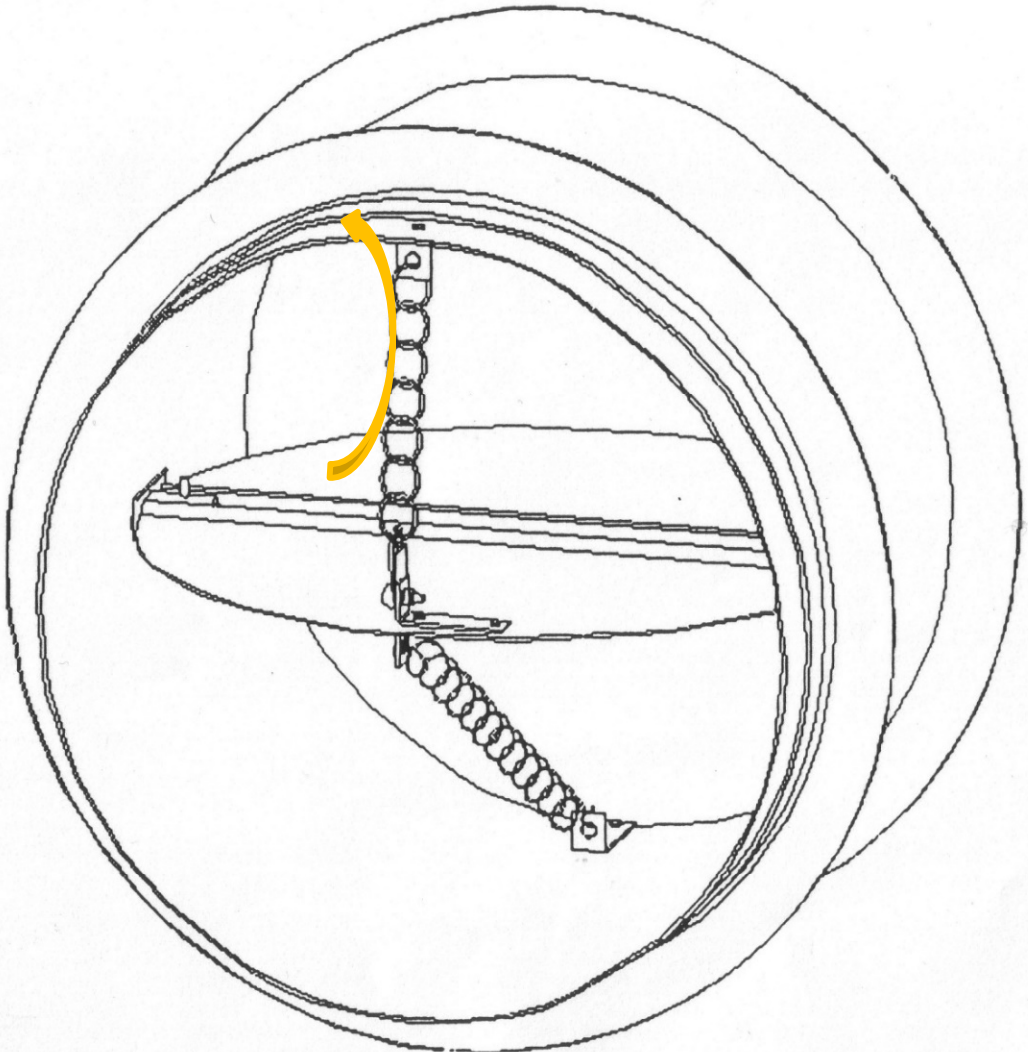
Thermal release 68°C

Single Blade Drop lock Fire Damper





SINGLE BLADE FIRE DAMPER



SINGLE BLADE (Circular) FIRE DAMPER

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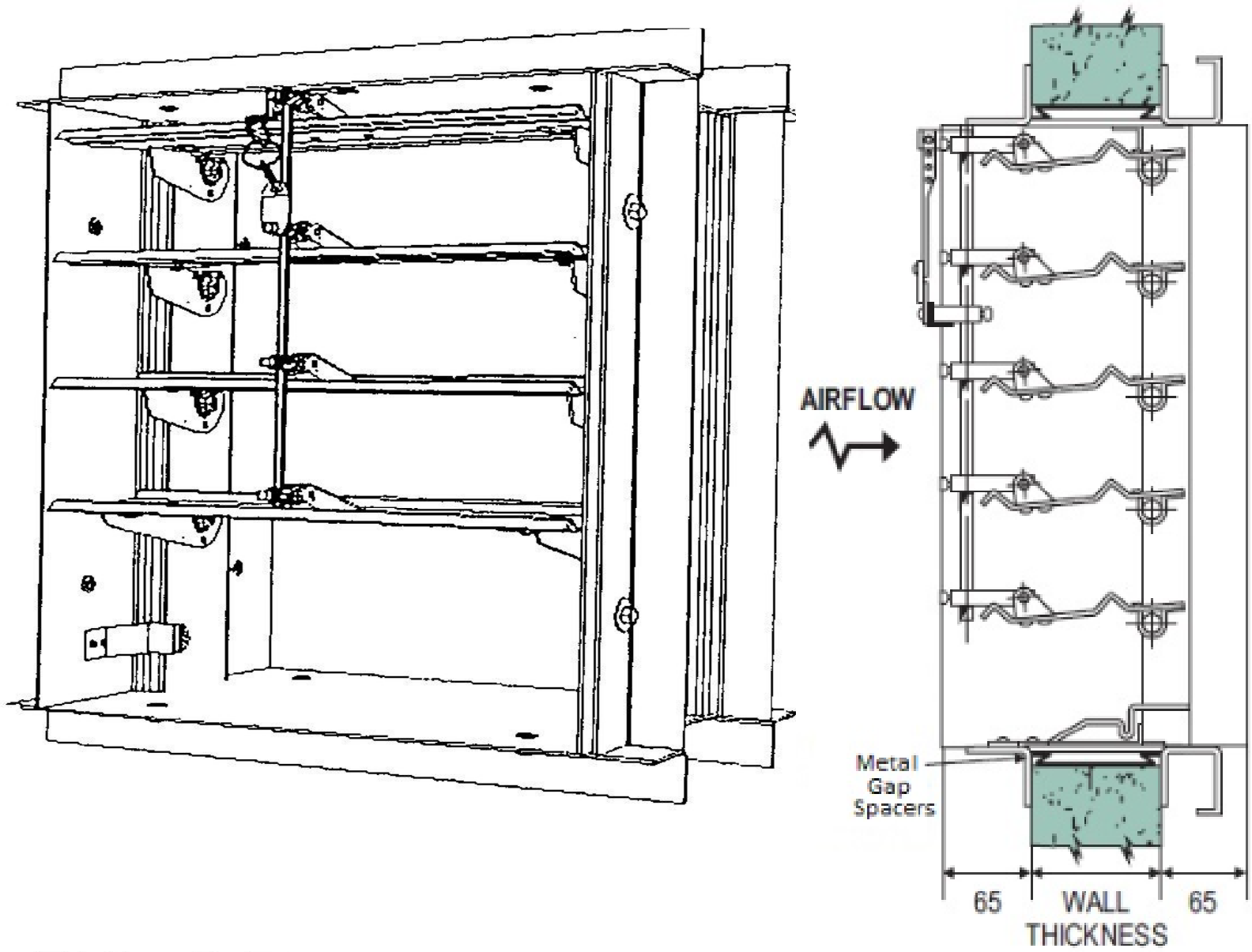
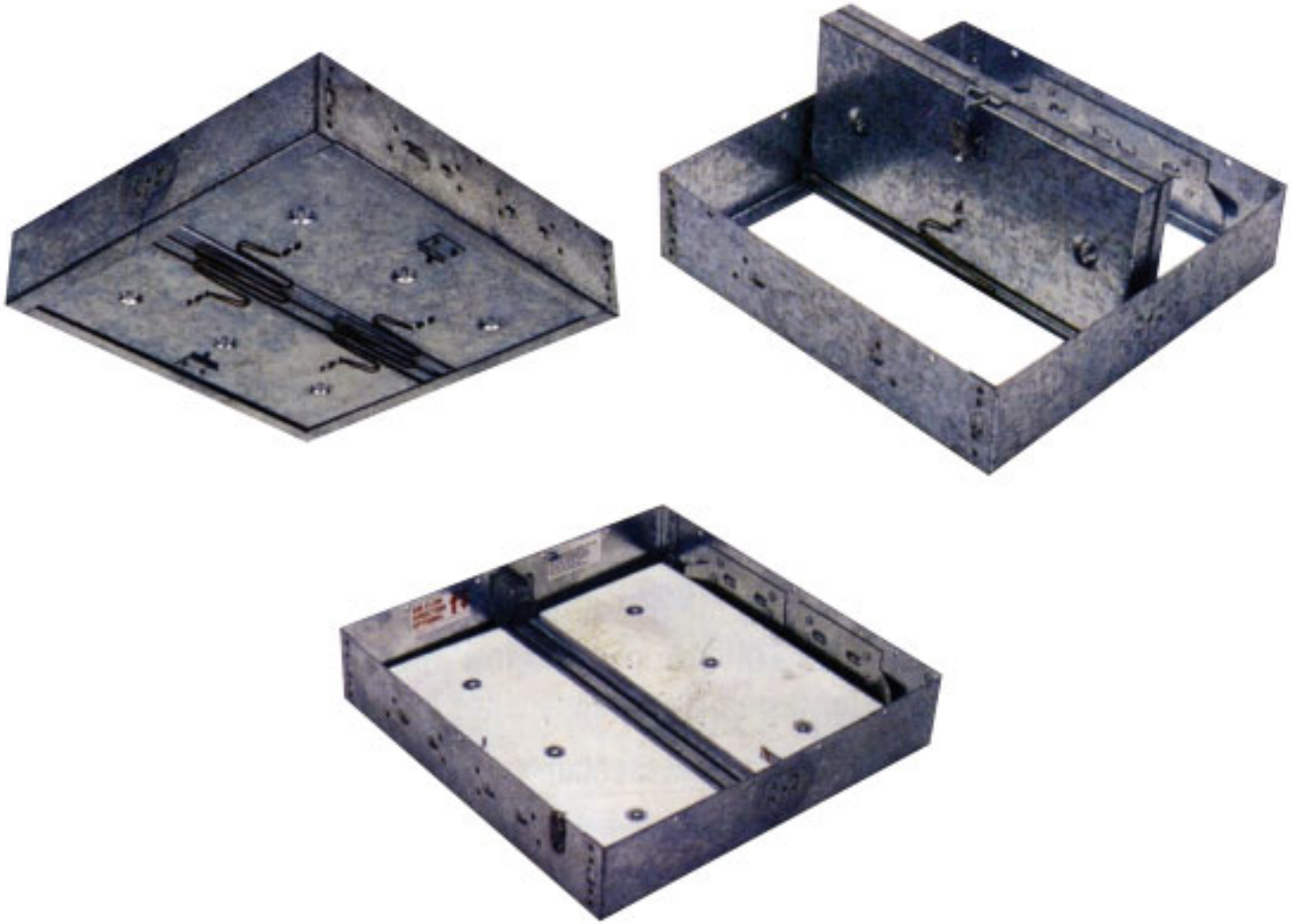


MULTI BLADE FIRE DAMPER



Control of the incipent fire spread in ceiling space *re. NCC A5G7*

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intumescent fire damper

Photo of Lorient LVH44 - C series intumescent fire damper after exposure to fire

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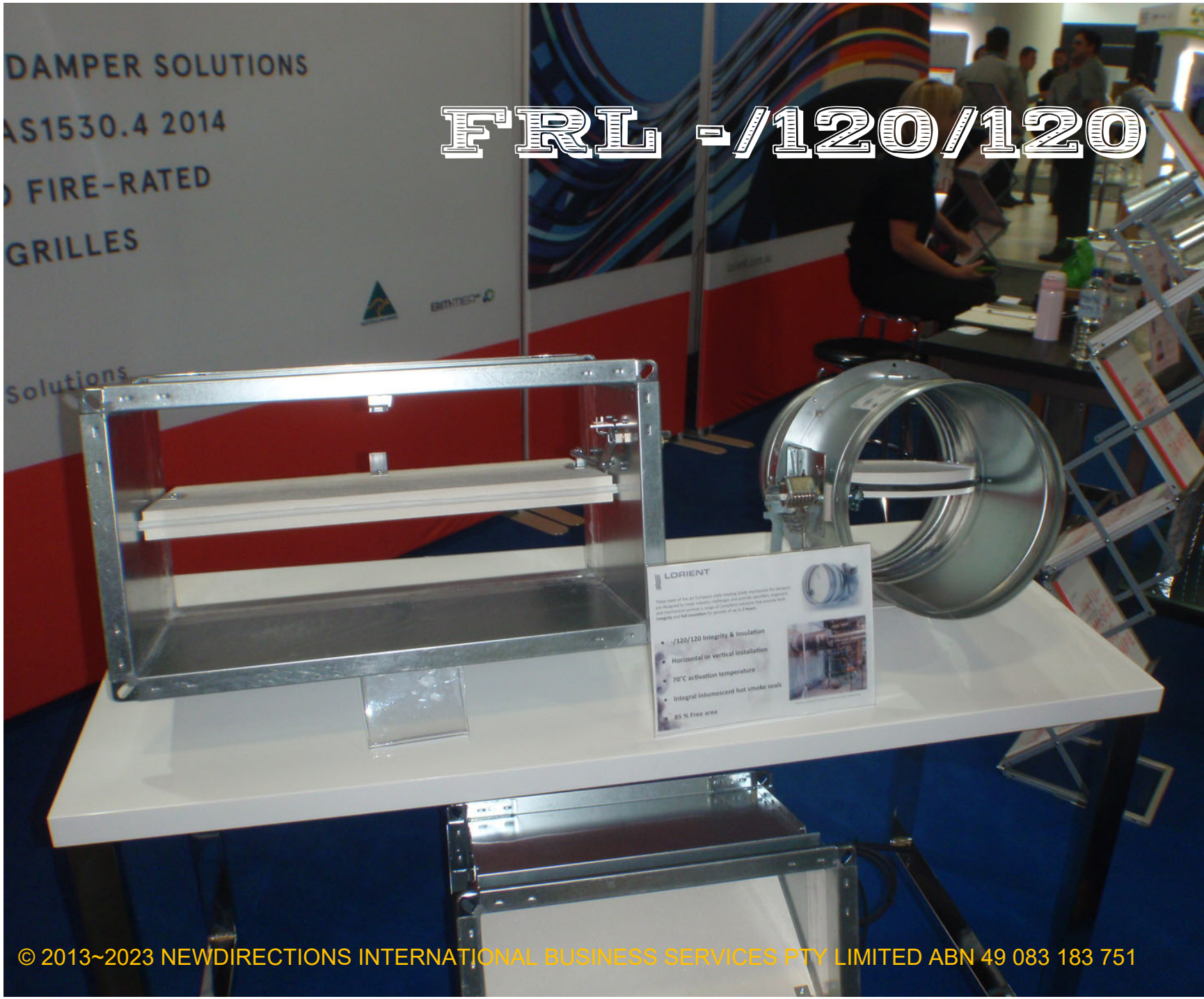

FRL -/120/120

FRL -/120/120

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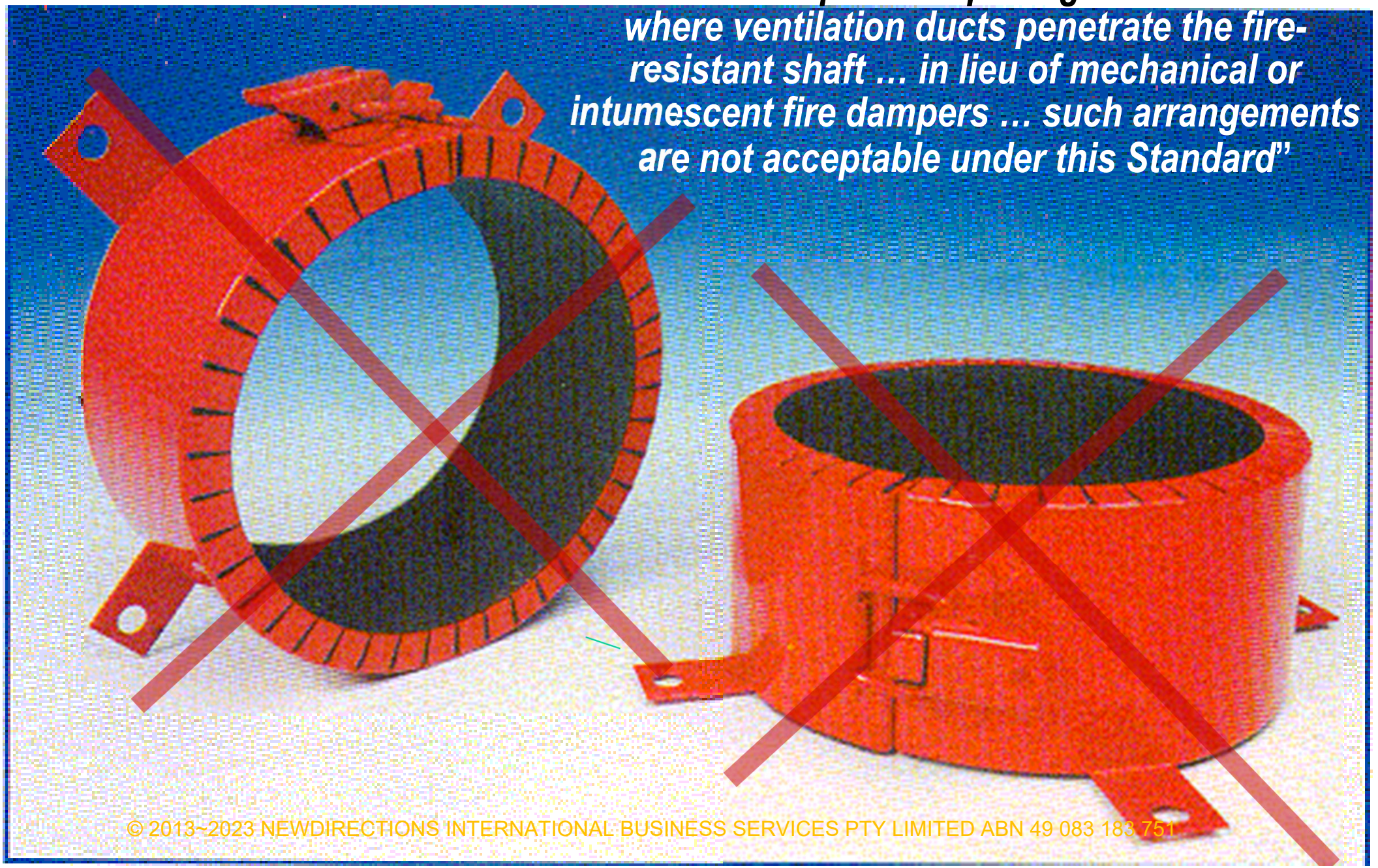
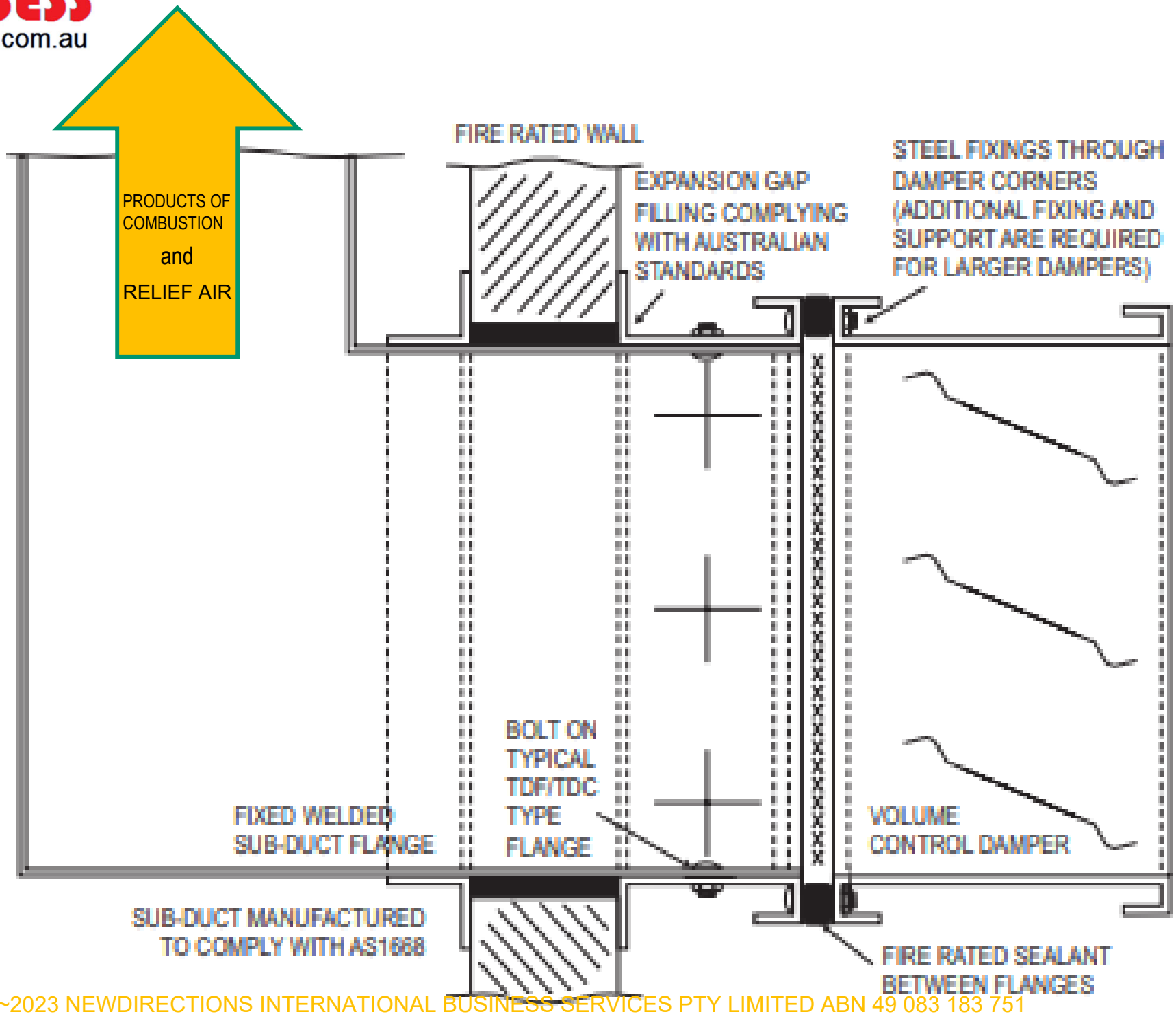
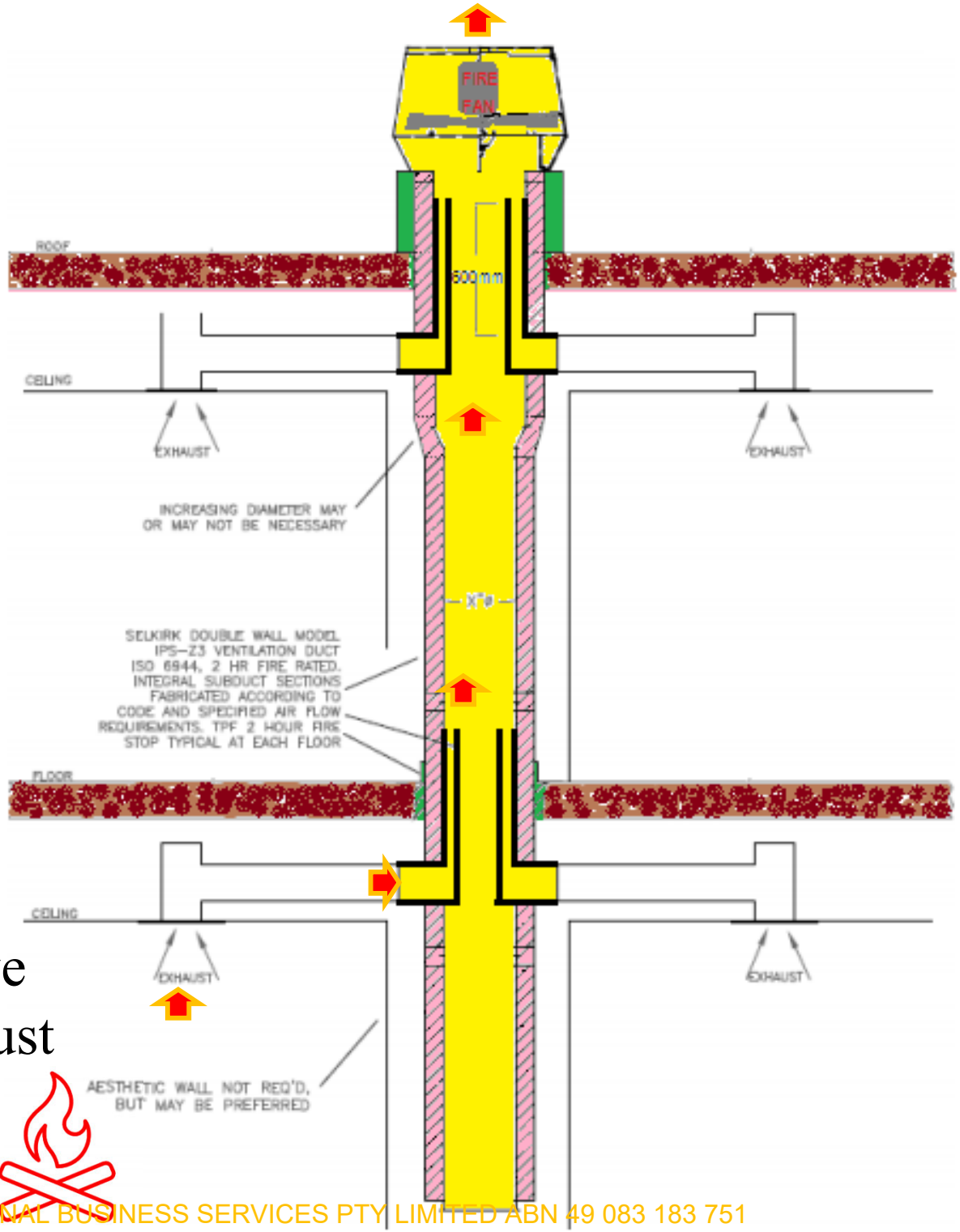
Fire Collars

Clause C2.1.1(a) of AS 4254 states: "*The use of fire collars to protect openings in riser shafts where ventilation ducts penetrate the fire-resistant shaft … in lieu of mechanical or intumescent fire dampers … such arrangements are not acceptable under this Standard*"







Sub-ducts provide an effective Pressure relief path and exhaust products of combustion

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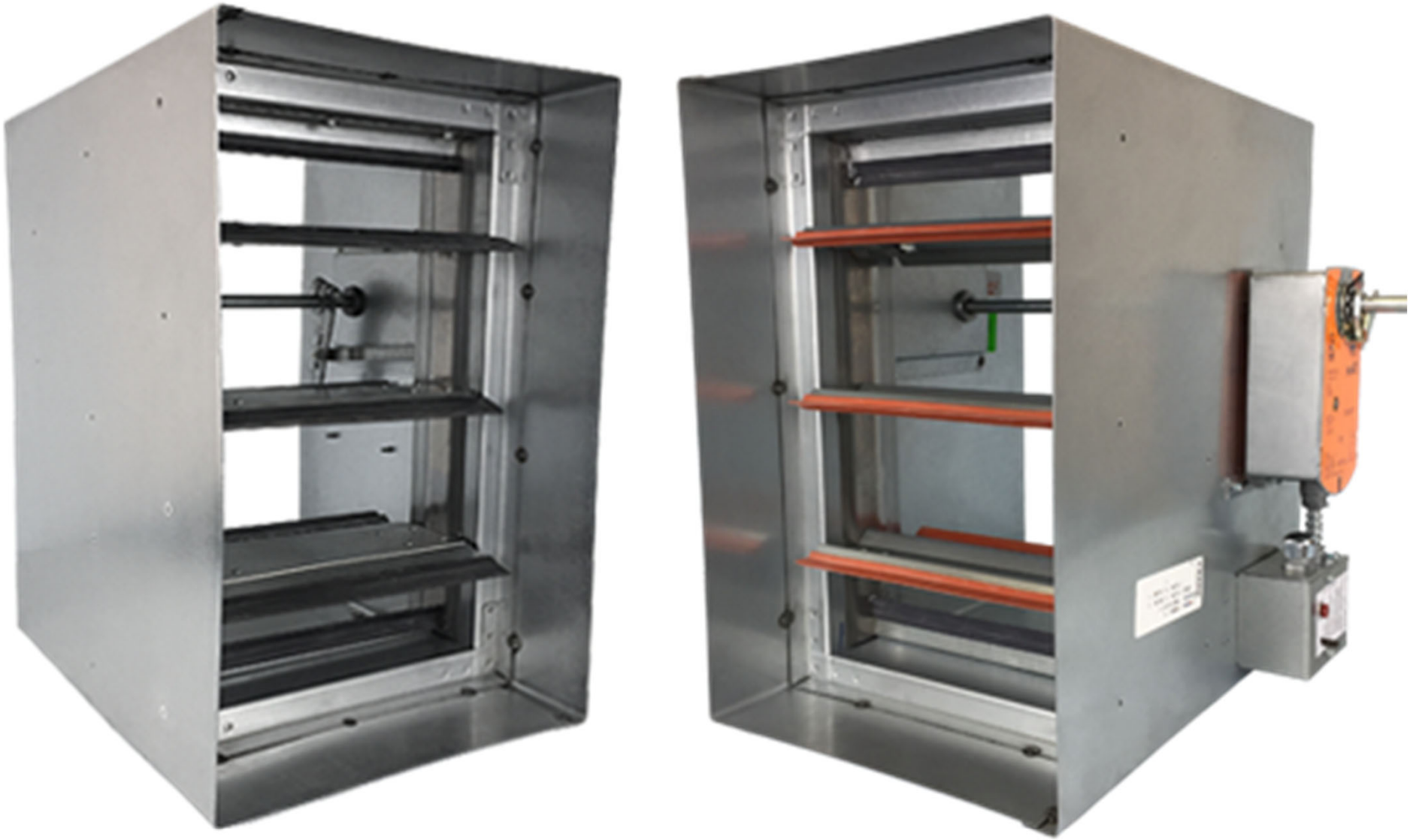
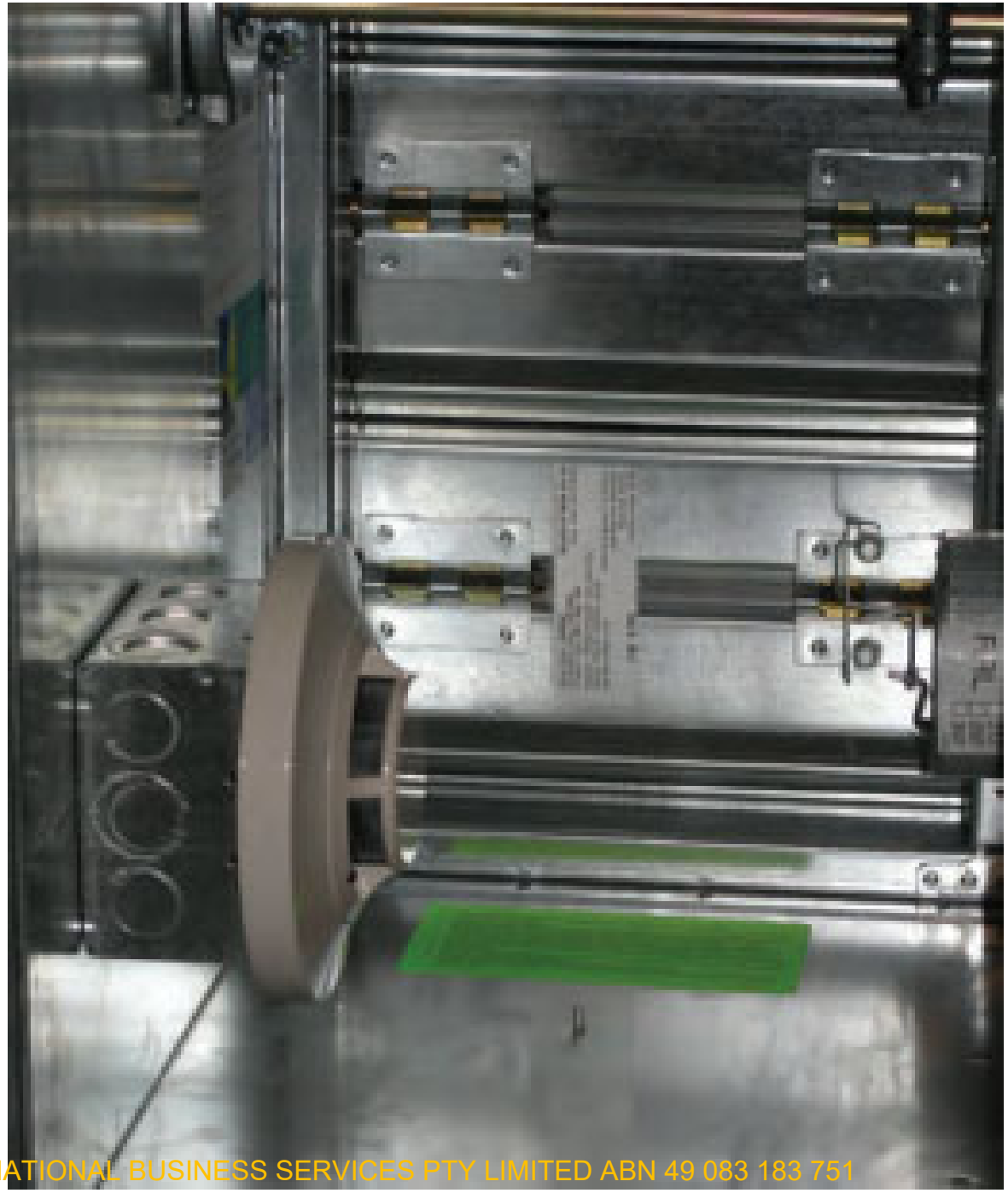


Smoke Damper



Smoke Damper

For Smoke Exhaust Damper motors:

There are actuators on the market (Belimo & Siemens) which have been Tested to operate at 177 Deg C , beyond this refer to AS1682.1 2015 (Page 18) 2.5.4 (d) referencing:

“proprietary enclosures” or “fabricated insulation suitable for the duty”.

We are unaware of either of those that have been Tested but it is unsure if they need to be , an enclosure lined with kaoboard would withstand 1000°C but there is no protective covering for the electrical cable that goes beyond 110°C . Therefore at this stage it appears the best that can be done is go with the 177°C Actuator, Bullocks do have a mounting platform on their damper which extends the Actuator 50mm away from the damper body which would assist in delaying the transfer of heat from within the duct *(if the heat was in the duct)* . Operationally, if the damper is fail open, then all of the above is unnecessary , see AS1682.2-2015 2.5.3 Note.

END OF PAPER No. 3