

SUCCESSFUL PASSIVE FIRE PROTECTION. AVOIDING THE POTENTIAL DISASTER AWAITING DEVELOPERS

成功的防火—如何避免公寓和联排开发中的灾难!

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ABOUT THE WRITER



Michael James 新西兰顶尖建筑防火咨询公司Originfire (www.originfire.co.nz)-CEO及总工程师，超过25年的建筑防火工程设计，管理和实践经验，参与和主持多个大型建筑的防火工程设计和建设。有丰富的和council以及和fire service交流经验，针对公寓楼、高层建筑、大型建筑防火难题有独到的解决方式。专注解决建筑行业防火难题，为客户节省大量时间和资金。Michael 还曾经担任Pacific Consultants (太平洋) 工程咨询公司的管理总裁 (former managing director for Pacific Consultants); Society of Fire Protection Engineers (**PMSFPE**, vice president for New Zealand chapter) (国际消防工程师协会新西兰副主席)。

BACKGROUND 背景

Passive fire protection (PFP) is an integral component of the three components of structural fire protection and fire safety in a building. PFP attempts to contain fires or slow the spread, through use of fire-resistant walls, floors, and doors (amongst other examples). PFP systems must comply with the associated listing and approval use and compliance in order to provide the effectiveness expected by building codes.

被动防火（消防），指通过使用耐火的墙壁、地板、防火阀、阻燃包层和门及其他，以遏制火灾或减缓火焰的传播，是一座建筑物结构防火和火灾安全的一个不可分割的组成部分。被动消防系统必须经安全认证机构批准才可使用，以实现建筑规范所期望的效果。

Over the past five years many building owners have been required to re-clad their buildings because the building is leaking. At the same time, some building owners are also discovering that the interior construction of their buildings is defective. Some building owners have been able to recover repair costs. Others find themselves having to cover most of the repair. What has gone wrong? How can past mistakes be avoided? Michael James, Managing Director of Origin Fire Consultants discusses how to avoid one critical interior construction disaster and put successful passive fire protection in place.

在过去5年以来，新西兰有很多业主因为建筑漏水和建筑内建问题而更换外墙或者进行大范围的建筑维修。有一部分业主能够通过法律途径，弥补一部分建筑维修的损失；即便如此，业主们通常要负担大部分的维修费用。其中，一部分重要的建筑缺陷，是给排水管道，电缆和暖通管道系统在通过防火墙或者防火地板时，没有经过合理的防火处理。Michael James，新西兰顶级防火咨询公司的总裁和首席工程师，在本文针对如何避免公寓和联排开发中建筑内部缺陷和如何进行成功的被动防火（消防），给出答案。

DEFECTIVE FIRE RATING 防火缺陷

When cables, pipes and ducts pass through fire rated walls and floors, the fire rating of the penetration needs to have the same rating as the wall or floor it passes through. There are multiple ways of achieving this; depending on the construction of the wall or floor, and also the material and size of the service passing through it. Normally more than one product, termed a fire stopping system, is required to achieve compliance. To be approved, these systems need to be tested in the exact configuration that they are going to be used in the building. This means the same wall or floor materials, and the same service size and materials. The systems are tested to Australian Standards AS 1530.4 and AS 4702.1.

当给排水管道，电缆和暖通管道系统通过防火墙和防火地板时，造成的“穿透”，必须进行和墙体地板同样规格的防火处理。有很多方法，可以实现，取决于墙体和地板的材料，以及管道穿透的大小。通常，防火不能只是通过选用一种防火部件，而是多种部件所构成的防火系统。为了通过验证，通常防火系统需要以确切的配置进行测试，这些配置将用于建筑工地，这意味着建设时采用相同的墙壁或地板材料以及穿透的尺寸和材料。这些系统，一般是在符合澳大利亚标准AS 1530.4和AS 4702.1的一个炉中进行测试。

PAST PROCESS 过往防火设计流程

In the past, the process from design to construction for fire rating penetrations was based on the fact that the penetrations should be rated to the same rating as the wall or floor they are passing through. The building structure went up and the pipes, cables and ducts were installed, with the plumber, electrician, data cable installer, television aerial installer, mechanical contractor and fire alarm contractor taking responsibility, where required, for fire rating their systems. The plasterboard installer was required to leave a wall suitable for fire stopping.

Unfortunately, none of these installers had specialist knowledge of the design, selection or installation of systems and products which were usually purchased from local trade suppliers without any supporting literature or technical backup. This often meant the wrong products were chosen, applied and installed incorrectly. The pressure of construction timeframes and a lack of checking often led to nothing being done to address the defects.

The resulting failings then were due to inadequate planning in the design stage. Too many contractors were required to coordinate their activities to achieve something possible to fire rate.

Those responsible for carrying out the fire rating had inadequate knowledge of the products and systems suitable to achieve the desired fire rating. Often they had no idea how the products should have been installed. Last but not least, throughout construction there was a lack of checking and accountability.

过去，从设计到建设被动防火一般采用“多方参与模式”。防火报告说明给排水管道，电缆和暖通管道系统通过防火墙和防火地板时，造成的“穿透”，必须进行和墙体地板同样规格的防火处理；建筑结构搭建，给排水管道，电缆和暖通管道系统安装；水管工，电工，数据线安装人员，电视线安装人员，机械承包商和火灾报警承包商分别被要求负责对其系统进行防火；石膏板安装人员被要求留下适合防火安装的墙壁。

这样的缺陷是：安装人员，通常没有安装防火系统的技术知识，并且经常从没有防火安全产品执照的当地贸易供应商采购的产品。这意味着错误的产品，被用于错误的系统，并且安装不正确。建设时间的压力，缺乏建设检查，经常导致表面上建筑进程完成，但是防火安装工作没有适当进行。

造成缺陷的原因是在设计阶段没有合理的防火设计。太多方被要求参与到防火建设中。而参与方往往没有足够的防火产品和系统认识，不知道防火产品应该如何被正确安装。最后也是重要一点，整个建设过程缺乏检查和责任归属。

PUTTING SUCCESSFUL PASSIVE FIRE PROTECTION IN PLACE 成功的被动防火策略

The good news today is that we have learned a lot from past mistakes. There is now much more awareness of the problems and what constitutes best practice to resolve them.

BRANZ have recently published a guide to passive fire protection in buildings which can be downloaded for free from <http://www.branz.co.nz/passivefire>. It provides two strategies for successful design and installation of passive fire rating of systems.

The first strategy is to carry out a detailed design and selection of passive fire protection systems during the building design phase and prior to building consent. There are a number of advantages in carrying out a detailed design prior to building consent. One is the opportunity to alter the basic design at no cost to minimize passive fire penetrations. For example, placing toilets, basins and showers on non-fire rated walls means significant

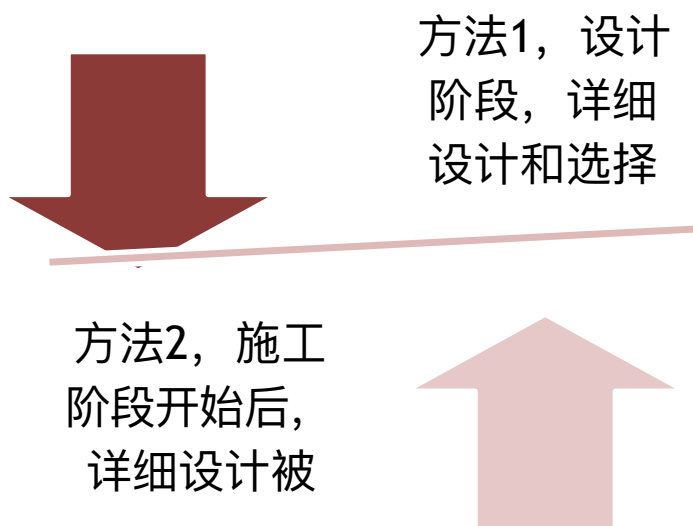
money can be saved by not having to fire rate them at all. Material selection of walls and floors can be chosen to allow for suitable selections of compliant fire stopping systems which optimize cost-effectiveness. Building services can be coordinated to make it easier to fire rate them. Tenderers can then focus on providing the best price rather than having to design and price, and then add a factor for risk. Origin Fire's experience in carrying out designs using this method is that at tender time meaningful discussions can be had with all tenderers to optimize system selections and reduce cost. The one disadvantage of this method is that if the building construction or building services installation changes during construction then the design will have to be updated. However this is a normal scenario that is accommodated for all other parts of the building designed prior to tender.

The second strategy is to agree on the passive fire protection performance requirements and quality assurance process prior to consent but leave the detailed design till the beginning of the construction phase. The advantage of this approach is that the design can be based on the actual construction rather than what was envisaged at consent and tender stage. The disadvantages of this method are that the building structure, materials and layout are largely fixed and there is not the opportunity to make the same savings as identified in the first strategy. It is also unusual to solve all passive fire problems using the products from a single manufacturer and currently a lot of installers are tied to using a single manufacturers product which leads to inefficient system selections.

Of the two methods, Origin Fire's preferred method is the first method. However, both options can be made to work successfully if the right people are involved in the project from the outset.

当前，好消息是我们从过往的错误中吸取了教训。对防火问题和正确实施方案，我们有了更加深刻的认识。Branz 最近发表了建筑防火指南，可以在此处免费下载<http://www.branz.co.nz/passivefire>。该指南指出，建筑防火分为种办法：

- 方法1，提前于建筑许可 (building consent) ，在设计阶段，详细设计和选择防火系统；
- 方法2，提前于建筑许可 (building consent) ，同意被动防火性能要求和质量保证，但将详细设计留到施工阶段开始。



方法1，在设计阶段详细设计和选择防火系统

- 优点是：可以改变基本设计，可以减少被动防火建设和材料上的花费。

案例分析：如果可以在非防火墙壁（地板）上放置厕所，盆浴和淋浴，那么可以通过不必对它们进行任何防火保护来节省大量的金钱。此外，可以选择墙壁和地板的材料选择，允许适当选择优化成本的合规系统。可以协调建筑服务商，使其更易于建立防火保护。在招标阶段，可以专注于提供最优惠的价格，而不是设计和价格加上风险因素。我们Origin Fire使用这种方法进行设计的经验是，在招标阶段的时候，可以通过优化系统选择和降低成本的投标来进行有价格和系统优化的讨论。

- 缺点是：如果在施工过程中发生变化，那么将会进行设计返修以适应变化。但是，这种返回修改是一般建筑设计在招标之前都会遇到的情况

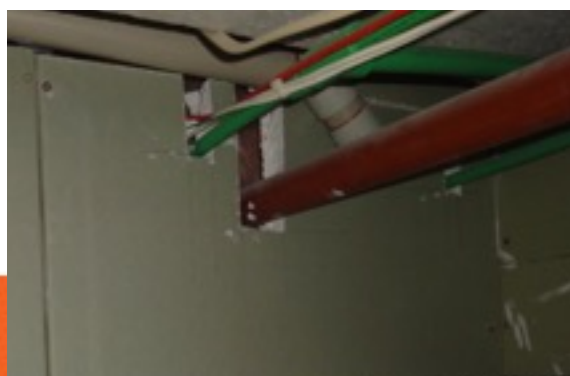
方法2，详细设计留到施工阶段

- 优点是：设计可以围绕实际施工，而不是投标文件的理论建设。
- 缺点是：修改困难

案例分析：对于方法2，建筑结构，材料和布局大部分是固定的，没有机会为在建筑结构基本固定的情况下，在施工阶段，做出防火成本的节省；另外，容易造成使用单个制造商的产品来解决所有防火问题的局面；目前很多施工阶段设计的案例，很多安装商都使用单一的制造商产品，导致低效的系统选择。

虽然，如果合适的人员参与项目，两种方法可能都可行。Origin Fire首选是第一种方法，更加节省成本和符合目前发展趋势

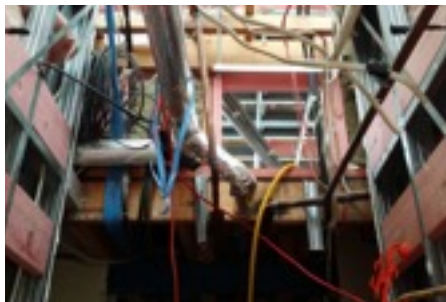
OTHER CASES 防火案例展示



Once, while this needed to be fire stopped, no-one chose to fire rate it; no-one regarded it as their job. 建设责任推脱，导致管道防火没有铺设



The packaging suggested this could be fire rated up to 4 hours; the fine print said it was not suitable for this application 管道外观看起来有4小时的防火能力（实际材料属性说明上查看并没有达到）



Imagine the impossibility of putting a fire wall through this. 给排水管道，电缆和暖通管道系统建设杂乱，导致防火墙无法铺设



Current day passive fire stopping -installed tested system and properly installed. 当前合理的防火建设