Building Australia's Future 2011 Conference

EXPANDED POLYSTYRENE SANDWICH PANELS CODE OF PRACTICE

Industry Working Collaboratively to Develop No-Regulatory Solutions

Version 2.0

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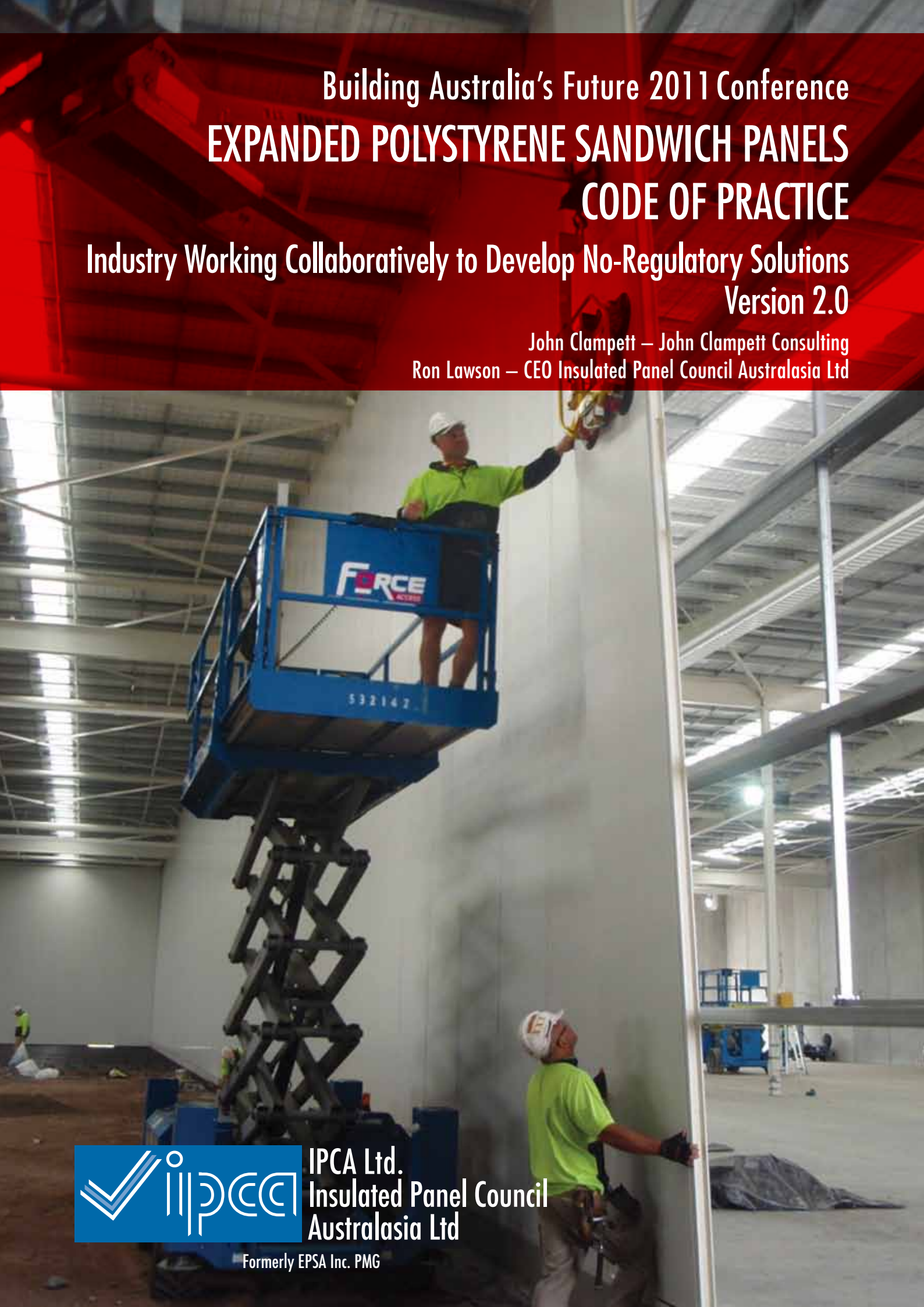

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CODE DISCLAIMER AND WARNING

It should be noted that the solutions in this voluntary Code of Practice (CODE) cannot guarantee safety or outcomes for occupants, fire fighters, or owners of buildings in the event of a fire due to the unpredictable nature and behaviour of fire, and the many variables that affect fire behaviour which are outside the control or influence of the recommendations of this CODE.

It is not the intention of *Insulated Panel Council Australasia Ltd (IPCA Ltd.)* that this voluntary CODE be used as a guarantee of the products produced or workmanship of the members and final jurisdiction and responsibility for fire performance rests with the relevant authorities and Code Compliant Companies' manufacturers and installers.

The accuracy and reliability of the content and recommendations should be independently confirmed by the reader.

Failure to implement proper risk management may result in loss, damage or injury and this voluntary CODE does not claim to cover every precaution that is required to prevent the risk of fire in Insulated Panel Structures built in accordance with the CODE.

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INDUSTRY WORKING COLLABORATIVELY TO DEVELOP NO-REGULATORY SOLUTIONS

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1.0 INTRODUCTION

This paper will discuss the introduction of a new industry Code of Practice("the CODE") for the installation of EPS Sandwich Panels. This Code of Practice, which has support of the AFAC, has been introduced to improve the performance of EPS Sandwich Panels in fire. The CODE addresses construction changes and design features that have been included to enhance Panel fire performance in Australia.

Metal faced Insulated Panels (also known as Sandwich Panels) with Expanded Polystyrene (EPS) cores are commonly used in the storage and food processing industries because they are durable, lightweight, easily cleaned, quick to construct and is easily modified. The core also has very good thermal insulating properties. These characteristics make EPS Sandwich Panels a very cost effective construction material for cold stores and similar facilities.

The majority of cool store and food processing plants in Australia incorporate Expanded Polystyrene (EPS) cored Insulated Sandwich Panels (ISP) as part of the building structure. Thus, it is no surprise that over the past 30 years some of these processing plants have been involved in fire incidents. In some of the incidents there was concern from the fire authorities that the EPS cored ISP did not perform as well as expected in fire situations.

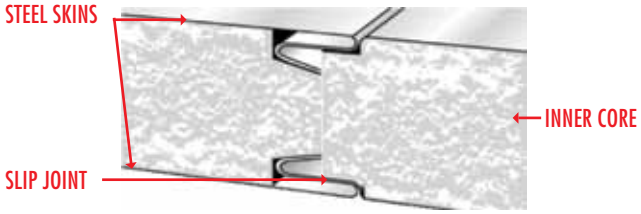
Thus, in line with international trends and best practice, the Insulated Panel Council Australasia Ltd (IPCA Ltd.) has introduced a voluntary; industry administered industry Code of Practice for Expanded Polystyrene (EPS) cored Insulated Sandwich Panel (ISP) for Class 7 and 8 Buildings. The key objective of the CODE is to increase fire fighter confidence when undertaking their operational role.

During this process the Insulated Panel Council Australasia Ltd (IPCA Ltd.) embarked upon a research and testing program to review ways of improving the performance of EPS cored ISP in fire situations. The results of this research and testing have also been transferred into practical application with the development of the industry Code of Practice for EPS cored ISP. This paper will not be covering in detail the research and testing undertaken, but focussing on the process of developing an industry Code of Practice.

1.1 WHAT ARE INSULATED SANDWICH PANELS?

Insulated Sandwich Panels (ISP) have been used for commercial construction in Australia for the past 50 years. Sandwich Panels are made when three separate elements are "***sandwiched together***" to form one structure, see Diagram 1. The combined properties of the; high tensile and compressive strength of the outer steel skins; and the high shear strength of the inner core leads to a building material which has a much longer spanning capacity and is lighter weight than traditional building materials.

DIAGRAM 1: TYPICAL SANDWICH PANEL



1.2 ADVANTAGES OF USING ISP

- Significantly reduces the amount of energy used to keep buildings within a comfortable temperature range.
- Light weight, low maintenance, recyclable and reusable.
- Uses the non ozone depleting insulants.
- Steel skins can be made with between 10-30% recycled material.
- Reduces landfill over standard framed construction methods.
- Provide continuous insulation that reduces or eliminates thermal bridging.
- Provides a consistent level of insulation that is impervious to compression, water vapour, vermin and rot.
- Reduced air-leakage/infiltration rates.
- Significantly shortens construction time.

The prominent disadvantage of EPS Panels has been the historical behavior in fires. The most common criticisms of EPS Panels in fire relate to the delaminating of the outer skins exposing the core, the structural stability of the Panels to stay in place and not collapse and the fire spreading within the panel. There have been improvements over time to the Panels by the addition of fire retardants, metal fixings, not using plastic fixings etc. The objective of this CODE is to bring all of these improvements, and others noted in further research and testing, together into one system and industry CODE.

2.0 DEVELOPMENT BACKGROUND

Development of the CODE began in 2008 in response to industry concerns about ISP performance in fire situations. The focus of the CODE was on aspects of building construction that manufacturers and installers of ISP have control over in relation to the structural performance in a fire situation. It was highlighted early in the process that matters such as mechanical smoke control and building use were not matters that the Panel manufacturers had any control over and therefore would not be part of the CODE.

The key objective of the CODE is to increase fire fighter confidence when undertaking their operational role. The intention of the CODE is to deliver a better performing Panel System in a fire. The **CODE DOES NOT** mitigate any requirements of the relevant building legislation. The CODE was not intended to be used in conjunction with a fire engineered alternative solution under the performance provisions of the Building Code of Australia. Design applications using the CODE as part of a building approval submission need to consult with the Fire Brigade having jurisdiction.

2.1 THE NEED FOR THE CODE

The behaviour of Expanded Polystyrene (EPS) core Insulated Sandwich Panels (ISP) in fires has been a concern of Fire Brigades for some time, not only in Australia, but also internationally. To address these Fire Brigade concerns, the Insulated Panel Council Australasia Ltd (IPCA Ltd.) undertook to develop an industry Code of Practice for the design specification, manufacture, construction, and maintenance and risk management for structures built using Expanded Polystyrene Fire Retardant Panel (EPS-FR Panel) Systems.

2.2 FIRE BRIGADE CONCERNS

The Fire Brigade concerns were essentially that the EPS core to the ISP's added to the fire spread, fire load and consequently to the structural stability of the Panels in a fire. The main concerns are that the Panel delaminates with the outer skins coming away from the core material and exposing the core material to the fire. Another concern was of the structural stability of the Panels during a fire in that they collapse, therefore making fire fighting more hazardous and again causing the core to be exposed. The other major concern was the fire spreading undetected within the Panel to other parts of the building.

In reviewing case studies, the most common criticisms of Insulated Panel performance have been failure of the Panel Systems to stay in place and therefore falling on fire fighters and allowing fire spread, fire spread within the Panels, the combustibility of the EPS core, poor ventilation of the smoke, poor way finding, and difficulties in Panel identification.

2.3 INDUSTRY RESPONSE

Despite the clear benefits of using EPS Sandwich Panels, the adverse view of the performance of EPS ISP's in fire was having a detrimental impact upon the take up and use of these Panels. Exaggerated claims by competitors and muted changes to Regulations and Standards brought more pressure to the EPS Panel industry. There had been previous invitations by the Fire Brigades to work together on this issue and in time the industry decided to accept the invitation. The Insulated Panel Council Australasia Ltd (IPCA Ltd.) then decided to take a proactive approach and undertook research and testing to clarify the true performance of EPS Sandwich Panels in fire to identify the true weakness and problems. This information was used in the development of the Code of Practice to produce a better performing Panel. The industry was of the belief that it was their role and responsibility to address the matter, and by doing so would gain respect and credibility for dealing with the issue themselves.

2.4 IMPROVEMENTS MADE OVER TIME, BUT NOT COMMUNICATED

One of the matters that did become evident was that improvements and enhancements made to EPS Sandwich Panels over the years had not been communicated to the markets, approval authorities and industry. Improvements such as fire retardant EPS, replacement of nylon fixings with steel fixings, steel used in lieu of aluminum etc. These improvements have been included in the CODE. There have been numerous changes to EPS Panels over the years to the point that the Panel, connections and fixing systems now used do not reflect the Panels that are cited in the fire case studies.

3.0 CODE DEVELOPMENT PROCESS

3.1 ENGAGEMENT WITH FIRE BRIGADES

The Fire Brigades, both in Australia and internationally, were the most vocal in the criticism of EPS Sandwich Panels on fires. In particular, the NSWFB were very strident in pointing out the issues and calling for change.

The Insulated Panel Council Australasia Ltd (IPCA Ltd.), after invitations from the Fire Brigades, did acknowledge that it must engage with the Fire Brigades to address the problem. The industry decided to meet several times with Fire Brigades and document the Fire Brigades concerns and then to work with the Fire Brigades in developing solutions to the problems.

Particular appreciation to Superintendant Chris Jurgeit from the NSWFB must be acknowledged as he provided a great deal of assistance and guidance in the development of the CODE.

As mentioned previously, the Fire Brigades main concerns were structural stability, delamination and spread of fire were their main issues. As will be discussed briefly later, this research and testing not only provided solutions, but also highlighted information that contradicted existing views on the behavior of EPS Panels in fires.

3.2 CONSULTATION WITH THE AUSTRALIAN BUILDING CODES BOARD

Part of the liaison process was to speak with the Australian Building Codes Board ("the ABCB") to ensure that, by developing an industry Code of Practice that this would not conflict with any policy or technical agenda of the ABCB. ABCB are obliged under COAG (Council of Australian Governments) to consider non-regulatory options in addressing identified problems or market failures. The ABCB do this through the application of the COAG Guide for Ministerial Councils and National Standard Setting Bodies on Best Practice Regulation. On this basis, non regulatory solutions that address market failure are encouraged.

3.3 AUSTRALASIAN FIRE AUTHORITIES COUNCIL

The matter of Insulated Panel Council Australasia Ltd (IPCA Ltd.) developing the Code of Practice was made known to the Australasian Fire Authorities and Emergency Services Council (AFAC) and the subject became a regular information item on the AFAC Built Environment Group meeting agenda. Drafts of the CODE were reviewed by members of AFAC throughout the process.

When the CODE was completed, a presentation was made to the AFAC Built Environment Group and a letter of support was provided by AFAC supporting the implementation of the CODE by Insulated Panel Council Australasia Ltd (IPCA Ltd). This outcome encourages the Panel industry to use the Code of Practice, as well as the Fire Brigades providing a view that any application for approval to the Fire Brigades that it will be expected that the proposal is Code Compliant.

3.4 THE AUSTRALIAN COMPETITION CONSUMER COMMISSION

The Australian Competition Consumer Commission (ACCC) provides guidelines for developing effective industry Codes of Conduct. The ACCC's interest in developing industry Codes of Practice (COP) is to improve compliance with the Trade Practices Act and to (self) regulate market behavior. The EPS COP was developed using the framework set out in the ACCC's Guidelines. As signatories to COP's sign on voluntarily under the ACCC model, COP's such as the Insulated Panel Council Australasia Ltd (IPCA Ltd.) CODE are introduced to address gaps in and/or lift the bar above existing regulatory requirements. It does not and cannot mitigate any requirements of relevant legislation.

While the ACCC does not expressly or impliedly endorse voluntarily Codes of Practice they do provide support in reviewing drafts of CODE and provide detailed feedback on structure and content. Feedback was sought from the ACCC and those comments were incorporated into the finalization of the document. The feedback included the structure of the CODE document as it contained drawings and diagrams it was suggested annexing this information to the back of the document. Other feedback from the ACCC that was included in amending the document related to further clarification of the objectives and the role of the Code Strategic Advisory and Review Committee that oversees compliance of the CODE. This included dealing with breaches of the CODE, collection CODE related data to provide an Annual Report on the operation of the CODE and setting timeframes for regular reviews of the CODE.

One of the challenges in developing the COP was that it also included the EPS Panel Certification Scheme. Therefore separating the CODE and the Scheme as two elements to ensure it was not a complex document to follow was an important consideration. Following the feedback from the ACCC, there were further amendments in the document's structure to ensure the CODE requirements and the Certification Scheme requirements were separated but still included appropriate referencing and connection to compliment the total CODE package.

4.0 RESEARCH AND TESTING UNDERTAKEN TO UNDERPIN CODE

The Insulated Panel Council Australasia Ltd (IPCA Ltd.) commissioned a literature review of all publically available information, such as test reports, science papers, case studies, press reports and research reports that related to Sandwich Panels, particularly EPS Panels. Another objective of the review was to identify solutions to the matters raised by the Fire Brigades that can be adopted by the industry in the CODE.

Also undertaken was additional testing of Sandwich Panels to confirm the fire performance of Sandwich Panels. The Building Research Association of New Zealand (BRANZ) was also looking into ways at improving the fire performance on EPS core ISP's[1]. The end result has been the determination that a combination of improved construction detail and risk management will significantly reduce the risk of buildings made with EPS cored ISP, catching fire in the first place, Panels falling down and total losses occurring. The work conducted by BRANZ showed some interesting and positive outcomes in terms of mitigating the risks involved in using Insulated Panels.

To verify and confirm that the results of the testing undertaken by BRANZ in the research project, representatives of the NSW Fire Brigade and the Insulated Panel Council Australasia Ltd (IPCA Ltd.) travelled to BRANZ in 2010 and repeated the tests that undertaken for the above BRANZ project. The results of the testing were identical to the previous results, thus confirming that the additional measures in the CODE were relevant as well as confirming earlier results that fire did not spread within the Panel[2].

In April 2011 further testing was undertaken in conjunction with AFAC and the University of NSW demonstrating the results of the BRANZ test and additional testing comparing non fire retarded EPS to fire retardant EPS. The results again confirmed that the fire does not spread within the Panel and the fire retardant EPS does not propagate fire when ignited.

4.1 OUTCOMES OF RESEARCH

This literature review not only provided examples of risks that needed to be mitigated and methods by which those risks could be mitigated but the literature review also provided interesting information, often contradictory, as to the performance of EPS Panels in fire. There were several very surprising findings from credible sources that have refuted many of the critical performance aspects of EPS Panels.

4.2 USE OF CASE STUDIES

A review of the literature on the subject of Sandwich Panel fires[3, 4, 5, 6], particularly related to reports in the popular press or media leads to several observations.

1. In some cases, reports on Sandwich Panel fires fail to provide sufficient description of the construction details used and therefore it can be difficult to understand how representative, or typical, the construction was of either past practices or current day specifications and assembly methods.
2. Statements about the performance of Insulated Metal Panels are sometimes made by interested parties or manufacturers of particular core materials that only highlight the benefits of their product and the disadvantages of a competing product and in doing so perpetuate selective and sometimes contradictory views of product performance in the literature.
3. Insulated Panels do not cause fires and are rarely the first items ignited. Poor housekeeping practices and management of process fire risk lead to fires which subsequently spread and expose the Insulated Panels.
4. Many case studies that claimed to be EPS Sandwich Panel fires were in fact not EPS Sandwich Panels or the EPS Sandwich Panel had no significant impact in relation to the fire.

4.3 COMBUSTIBILITY

The most common cores used in Sandwich Panel construction are EPS, Polyurethane Foam (PUR), Polyisocyanurate Foam (PIR) and Mineral Wool or Rock Fibre. EPS, PIR and PUR are all combustible. Mineral Wool Systems with combustible adhesives used to adhere the metal facings to the core are therefore combustible to some extent (but produce small amounts of energy in fire) as is Rock Fibre constituted with organic binders[3, 7, 8]. However, the performance of the Panel Systems in fire and the extent to which the core contributes to fire spread, intensity and development, depends not only on the combustibility of the core but also on the behaviour of the Panel System as a whole and the degree and length of time for which the core is protected from the fire. Less combustible cores will of course have a reduced potential for the Panel to contribute to the fire, and this may or may not be significant depending on the nature of the initiating fire in the building and its contents.

It is agreed that EPS Sandwich Panels do not start fires[7, 9] and they are rarely the item first ignited. There is also general agreement that the initiating fire needs to be sufficiently large before the Sandwich Panels have any significant impact upon the fire[7, 9,10].

4.4 SPREAD WITHIN THE PANEL

A major concern in fire situations has been that fire may spread within the Sandwich Panel unseen. Opinion has been divided as to whether fire spread occurs in the growth stages of a fire and or once flashover has occurred and how much impact it has on the outcome of a fire. Research studies looking into ways to improve the performance of EPS cored ISP[1] specifically investigated the subject of fire spreading within Panels with an EPS core. A 200mm by 200mm hole was cut in the 4,000mm (h) by 2,000mm (w), 100 mm thick EPS cored ISP and then a gas burner (up to 300 kW) placed next to the hole for 60 minutes. The EPS core of the ISP melted and burned where the fire impinged on the Panel and stopped burning once the flame/heat source was removed and did not propagate the fire spread by self-sustaining combustion through the core void (see Photo 1). At a sufficient distance from the fire source, unaffected EPS core remained.[1, 10, 11]

(PHOTO 1) EPS PANEL AFTER DIRECT EXPOSURE TO 300KW FIRE FOR 60 MINUTES AT BRANZ.

These results have been confirmed by subsequent replicate testing commission by the EPSA Group, and testing by the CSIRO which found ***"there was no evidence of fire spread within the cores prior to flash over"***[11]. Previous research conducted by the University of Canterbury where a hot flue (max 8000C˚) was placed flush against EPS cored ISP, concluded that ***"flame-retardant EPS will not support self-sustaining fire spread in the insulated cavity of PIP when the core is exposed to a direct radiant heat source"*** [12].

4.5 TOXICITY OF ISP IN FIRE

An often cited concern is the "***toxicity***" of EPS when it is burning. EPS, being a carbon based material will undergo combustion when a fire has reached a critical point, like all carbon based materials the products of combustion depending on the intensity of the fire and the level of oxygen available will be, carbon dioxide, carbon monoxide, soot, and a variety of other carbon based chemicals. Generally the most toxic chemical emitted from fires is carbon monoxide; the levels of this are directly related to the amount of oxygen available for combustion.

There is evidence that burning EPS is considered no a more toxic hazard than wood materials[13,14]. The black colour of the smoke from burning polystyrene is indicative of the amount of unburned particulate material in the incomplete products of combustion building contents contribute to the smoke produced as well. Fires in buildings with few external openings will burn inefficiently and produce more soot and particulate matter if there is insufficient air available to ensure complete combustion of the fuel. Cool stores by their very nature have few external openings and therefore fully developed fires in those buildings are likely to be strongly ventilation controlled and exhibit incomplete combustion.

5.0 IMPLEMENTATION OF THE CODE

Whilst the CODE is voluntary in nature, the certification process that the installation and Panel comply with the CODE is not voluntary and is administered by the Insulated Panel Council Australasia Ltd (IPCA Ltd.). The CODE requires specific design specifications be presented in the application such as; fixings of external walls to base; wall to wall corner details; and ceiling with hanging fastener details. The CODE also requires specific Panel installation details such as; perimeter suspension to all ceilings - ceilings not to be supported by panel walls; no nylon fixings or suspensions to be used; steel flashings and rivets only to be used. The CODE requires that Panel be made with fire grade (i.e. fire retardant) EPS. The CODE also requires emergency and safety measures for refrigerated and cooling chambers and post construction recommendations be provided to end users.

5.1 SCOPE

- The intention of the CODE is to deliver a better performing Panel System in a fire.
- The **CODE DOES NOT** mitigate any requirements of the relevant Building Legislation.
- The CODE is not intended to be used in conjunction with a fire engineered alternative solution under the performance provisions of the Building Code of Australia.
- Design applications using the CODE as part of a Building Approval Submission need to consult with the Fire Brigade having jurisdiction.

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5.2 OBJECTIVES

Compliance with the CODE will achieve a more fire stable structure and fire fighter confidence in EPS-FR Panel Systems, through:

(a) Establishing minimum principles and standards for:

(i) The design specification and approval of facilities incorporating such systems;

(ii) The manufacture and installation of EPS-FR Panel used in such systems;

(b) Promoting strategies to address the risk of fire, as well as the maintenance requirements and emergency planning procedures in facilities incorporating such systems; and

(c) Providing recognizable "***Code Branding Mark***" that distinguishes EPS-FR Panel System that construction that is complaint with this CODE.

5.3 CODE SUMMARY

Whilst the CODE is voluntary in nature, certification that a project has been installed to CODE requirements is not. For a project to be certified as Code Compliant:

- Manufacturers and installers of Panel must be signatories to the CODE.
- An application for certification of that the project is Code Compliant needs to be made to the Insulated Panel Council Australasia Ltd (IPCA Ltd.) CODE facilitator, including an Application Fee of $550. This application should include:
  - Design and detailing specifications;
  - Panel manufacture type;
  - Panel installation details/drawings;
  - Emergency and Safety measures for refrigerated and cooling chambers;
  - Post construction recommendations; and
  - Specification of where Panel Labels will go.

5.4 WHAT THE CODE WILL DO?

- Delay delamination and exposing the core.
- Delay collapse and provide early warning to the Fire Brigade.
- Fire Brigade education.
- Compliance Plate.
- Certification to ensure Compliance.
- Exceeds the requirements of the BCA i.e. Group 2 areas will be Group 1+ additional CODE measures.
- Fire Retardant or (EPS-FR) in accordance with AS1366.3 1992 will be used.
- Meeting ISO 9705 with the additions noted in this CODE.
- Including perimeter suspension.
- Implementation of a Certification Scheme.
- An Audit System.
- Identification process for fire fighters.
- Labels on the doors.
- Strategic fire plan to be located at entrance to the site, the fire control room.
- Fire Brigade sent a copy of the Certificate of Compliance and annual lists of Certified Buildings.
- Assist fire fighters to carry out appropriate Pre-incident Planning.
- Appropriate Panels in areas of food processing at elevated temperatures and cooking equipment or similar heat generation equipment/processes. "***Right Panel, Right Application***".
- Panel joint design and fixing to assist in addressing delamination.
- The provision of post construction occupancy recommendations for better ***"housekeeping"*** and emergency procedures that include.
- Implementing a regular inspection and maintenance regime.
- Risk Management planning for the site.
- Emergency procedures planning.
- Training to ensure experience, knowledge and standards remain relevant and applied.
- Removal of compliance if requirements **NOT** carried out.

5.5 WHAT IMPACT WILL THE CODE OF PRACTICE HAVE?

The CODE for the use of EPS core Metal Sandwich Panels in BCA Class 7 and 8 Buildings that incorporates construction specifications that reflect the findings of the previously discussed research as well as additional requirements relating to labelling and fire safety management practices. The Code of Practice includes detailed construction drawings that require the use of steel angles and screws for internal and external corner junctions as well as an external ceiling suspension system using threaded steel rods inserted through the panel. Importantly, no nylon fixings or suspensions are used and there are no aluminum rivets and no aluminum extrusions used at the Panel junctions.

The key to improving the fire performance of the Insulated Metal Panel assembly as a whole is to:

1) Keep the core material separated from contact with flame and air by keeping the metal facings in place using robust fixings that are able to withstand elevated temperatures (eg. steel angles and rivets); and

2) Provide external structural support for the ceiling Panels. Collapsing ceiling Panels are a hazard to fire fighters and are likely to expose the combustible core material to the fire, greatly accelerating the development of the fire. A good support system should be designed to avoid sudden or unexpected failure of the ceiling system and exhibit a ductile and gradual failure mechanism, allowing fire fighters sufficient time to react and retreat if necessary.

Both of these requirements have been implemented in the Code of Practice. Thus the CODE needs to be used in conjunction with good risk management practices, the judicious use of fire separating walls, ensuring good housekeeping, and general risk management such as having a "***Hot Work***" Permit system in place and ensuring that the correct Panel is chosen given the use the building or room will be put to.

5.6 BARRIERS TO CODE IMPLEMENTATION

The CODE has good industry support with over 80 % of industry signed up to the CODE. There are barriers to the uptake of the CODE as it is voluntary in nature. There will be costs involved with ensuring that the company involved in suppling or installing ISP is accredited as Code Compliant and cost of construction may be marginally higher, due to the use of steel ceiling supports, steel flashings and rivets etc. Ensuring the benefits of the CODE are well understood, working with all stakeholders such as manufactures; builders; building owners and occupiers; fire and emergency services; insurers; ABCB, and Standards Australia will help overcome these barriers. When insurers, building developers, building owners and fire services insist on building demonstrating Code Compliance, uptake will be rapid.

5.7 LONG TERM PLAN

Implementation of the CODE began on 1 December 2010. The Insulated Panel Council Australasia Ltd (IPCA Ltd.) will continue to support the Certification Scheme, conduct information sessions where required and provide advice to new and current signatories on how to be Code Compliant.

Presently the CODE is based specifically on the fire performance of EPS cored ISP for Class 7 and 8 Buildings. Longer term goals are to expand the CODE for other BCA Classifications of buildings and core types; and to review issues other than performance in fires situations such as vapour barrier sealing, hygiene and thermal performance.

Insulated Panel Council Australasia Ltd (IPCA Ltd.) will continue with an experimental program in conjunction with AFAC to look at ways to improve the performance of Insulated Panels in a variety of configurations and conditions. In fact a research program in conjunction with AFAC, UNSW, ARUP, City University of Hong Kong and University of Science and Technology of China to improve the performance of fire retardant EPS Panel. Develope computer modelling and testing of products researched.

6.0 CONCLUSION

The Insulated Panel Council of Ltd (IPCA Ltd.) was faced with an issue that impacted upon the whole Sandwich Panel industry. That issue being the performance of Sandwich Panels in fires. As an industry, a decision was taken to provide an industry solution to the matter and develop a Code of Practice that would provide a better performing Sandwich Panel in a fire. The main objective was to improve Fire Brigade confidence in Sandwich Panels and that involved and consultation with the Fire Brigades in putting together the CODE. During the process a lot of significant issues were learnt.

It is important to act quickly to gain the respect of the approval and regulatory authorities to show that you are taking the matter seriously and are genuine in addressing the issue. It was also important to undertake additional research. This research is not only to gather information that already exists and to gain a better appreciation of the issues, but also gives the resultant CODE credibility and authenticity in that it is based upon sound data and information.

Wide and inclusive stakeholder involvement was fundamental to ensure that, not only that all parties had a say in what the CODE should contain and achieve, but also that there was ownership by stakeholders in the process. This also imposes a responsibility and pressure on the industry in that it must deliver on its commitment and comply so as not to damage any relationships. This was why it was important for the CODE to be reviewed by the ACCC to provide transparency and also any potential conflict with the Trade Practices Act.

Marketing the benefits to the Sandwich Panel industry is a very important aspect so that they clearly understand that this is a positive step and not just another regulatory imposition. In addition, to provide continual improvement to the CODE so that it remains relevant and therefore of value to both the industry and the stakeholders involved.

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8.0 EXECUTIVE SUMMARY

The majority of cool store and food processing plants in Australia Incorporate Expanded Polystyrene (EPS) cored Insulated Sandwich Panels (ISP) as part of the building structure. Thus it is no surprise that over the past 30 years some of these processing plants have been involved in large scale fire incidents. In some of the incidents there was concern from the fire authorities that the EPS cored ISP did not perform as well as expected in fire situations. Thus the Insulated Panel Council Australasia Ltd (IPCA Ltd.) embarked upon a research program to review ways of improving the performance of EPS cored ISP in fire situations. The results of this research have been transferred into a practical application with the development of the industry Code of Practice (CODE) for EPS cored ISP for Class 7 and 8 Buildings.

The key objective of the CODE is to increase fire fighter confidence when undertaking their operational role. The focus of the CODE is on aspects of building construction manufacturers and installers of ISP have control over in relation to the structural performance of ISP in a fire situation. The intention of the CODE is to deliver a better performing Panel System in a fire. The **CODE DOES NOT** mitigate any requirements of the relevant building legislation. The CODE is not intended to be used in conjunction with a fire engineered alternative solution under the performance provisions of the Building Code of Australia. Design applications using the CODE as part of a building approval submission need to consult with the Fire Brigade having jurisdiction.

Whilst the CODE is voluntary in nature, certification that a project has been installed to CODE requirements is administered by the IPCA Ltd. The CODE requires specific design specifications be presented in the application such as; fixings of external walls to base; wall to wall corner details; and ceiling with hanging fastener details. The CODE also requires specific Panel installation details such as; perimeter suspension to all ceilings-ceilings not to be supported by panel walls; no nylon fixings or suspensions to be used; steel flashings and rivets only to be used. The CODE requires that panel be made with fire grade EPS. The CODE also requires; emergency and safety measures for refrigerated and cooling chambers; and post construction recommendations be provided to end users.

NOTES

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