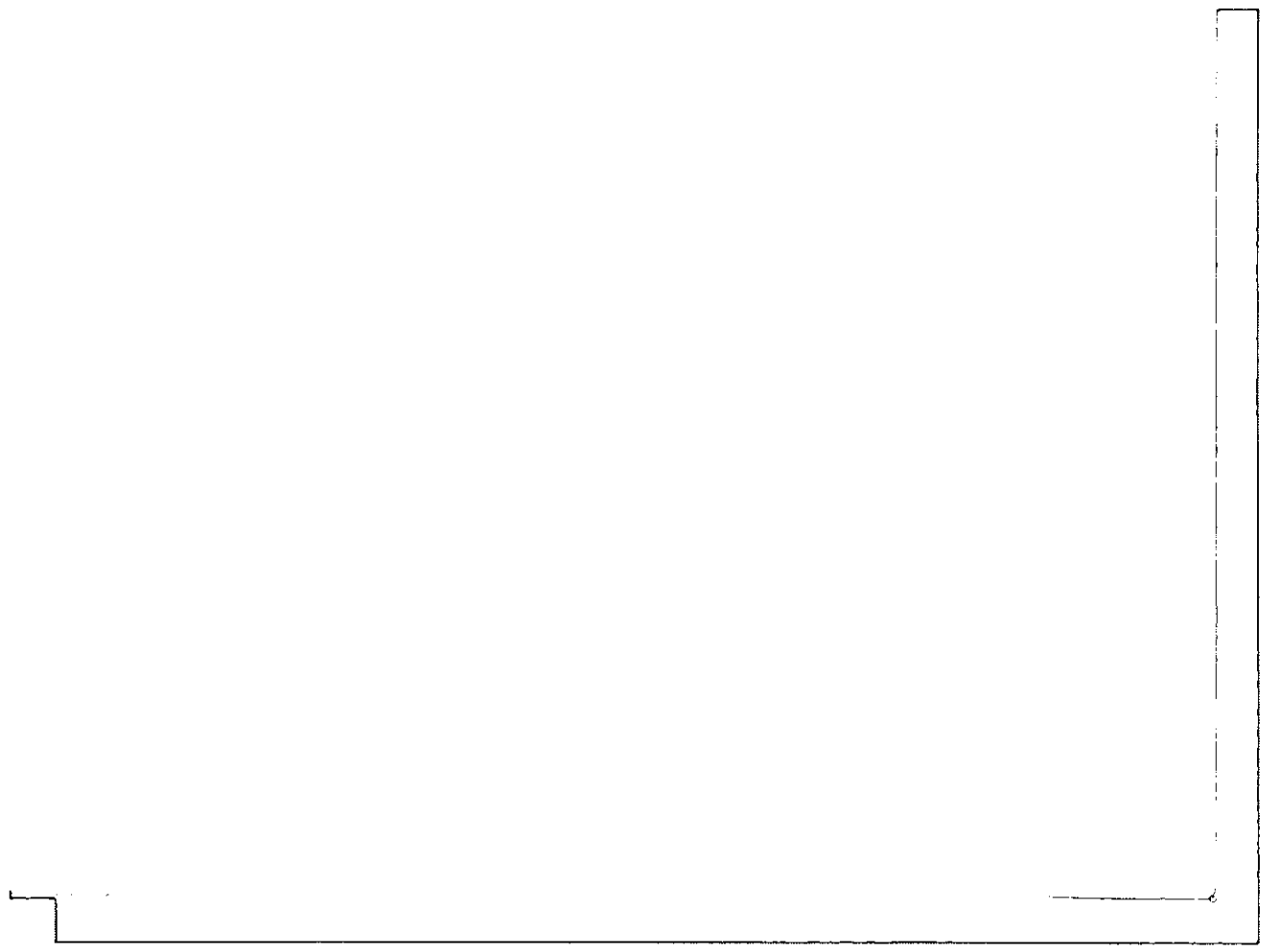

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THE RESOURCE CENTRE FOR BUILDING EXCELLENCE

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How Well Do Building Plastics Shape Up ?

Neil Trebilco

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BRANZ survey

How well do building plastics shape up?

By and large the use of plastics in buildings is working well. But a BRANZ survey turned up some interesting results.

By Neil Trebilco

BRANZ distributed a questionnaire on building plastics to the building industry through its *Build* magazine. The survey looked specifically at problems encountered with various plastics used in buildings, concentrating on five main areas: piping (including plumbing, spouting, conduit, drainage), vapour barriers, claddings, glazings and floorings. Respondents could also note any other problems they had found in using plastics.

As the questionnaire went to all of *Build's* 12,000 subscribers, a broad cross-section of the building industry was covered. Almost 300 responses were received with over half of them from builders, plumbers and drainlayers. Approximately one in twenty replies were from engineers.

The survey questionnaire was essentially divided into two halves. In the first, respondents were asked about all areas of plastics use in buildings. They were then asked to select their major problem area and answer questions focusing on that.

The survey results are largely a summation of the experience of plastic product users rather than manufacturers, distributors or others who might have a vested interest. In spite of this, and the survey's focus on problems encountered with plastics, more than 85% of those who replied thought the performance of plastics in buildings was average or better. Only 10% said performance was poor. Plumbers were more likely to have decided views than other user groups – they tended to rate performance as good or poor rather than as average or expressing no opinion at all.

Of the five main use areas the majority of experience was in plastic piping systems. Not surprisingly, this was reflected in piping systems also showing up as causing the greatest number of problems (51% of respondents). Amongst those who singled out piping as the greatest problem area, 29% of failures were considered to be due to faulty installation, 22% to faulty product design and 17% to manufacturing defects. Those problems caused by poor installation proved to be the most expensive to fix.

Plumbers may be considered as the largest defined grouping with detailed piping knowledge and experience with 94% claiming 10 or more years experience. Perhaps not surprisingly, 88% of plumbers who responded said plastic piping was their worst plastics problem area.

Of interest is that plumbers singled out faulty installation more than any other single cause of piping failure. Faulty product design however, because it was more likely to result in multiple failures, caused the greatest total number of failures. Faulty product design and faulty manufacture were said by plumbers to contribute more problems than all other causes combined.

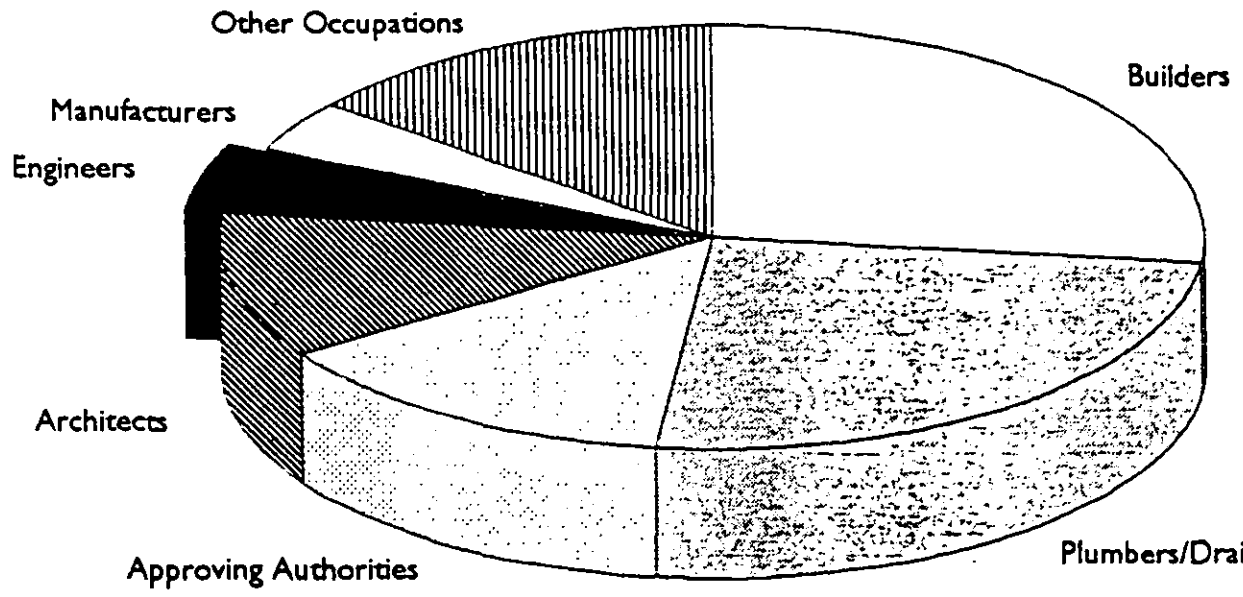
Polybutylene (29%), PVC (26%) and acetal (24%) plastics were the most commonly cited piping problem-causers. Plumbers attributed fully a third of failures to acetal, followed by polybutylene (28%) and rigid PVC (22%). These results for polybutylene (PB) and acetal give ground for some concern since PB usage is only about 2% by weight of PVC and acetal even less.

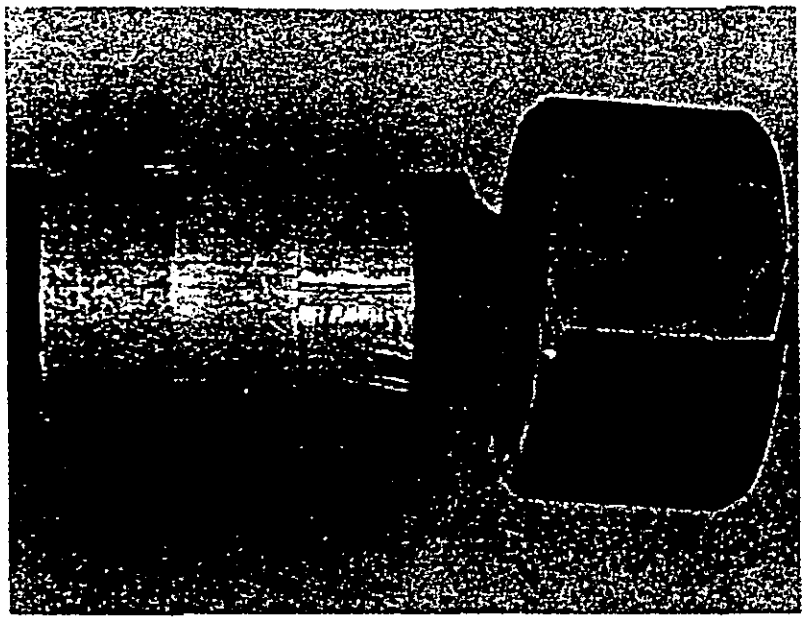
From BRANZ experience, the main source of failures is piping fittings. These may fail by cracking or breaking (acetal) or by becoming loose (acetal and metal fittings) and subsequently leaking. Not many of the problems are expected to relate to the piping itself although polybutylene has been known to split and occasionally to be gnawed through by rodents. There has also been some splitting of copper crimp rings and erosion or pitting of acetal fittings adjacent to brass nuts.

After piping, the product type that people had most experience with was vapour barriers followed by plastic glazing, claddings and floorings. Perhaps because vapour barriers are less visible they were not considered to be much of a problem except by approving authorities such as councils who ranked them a clear second after piping.

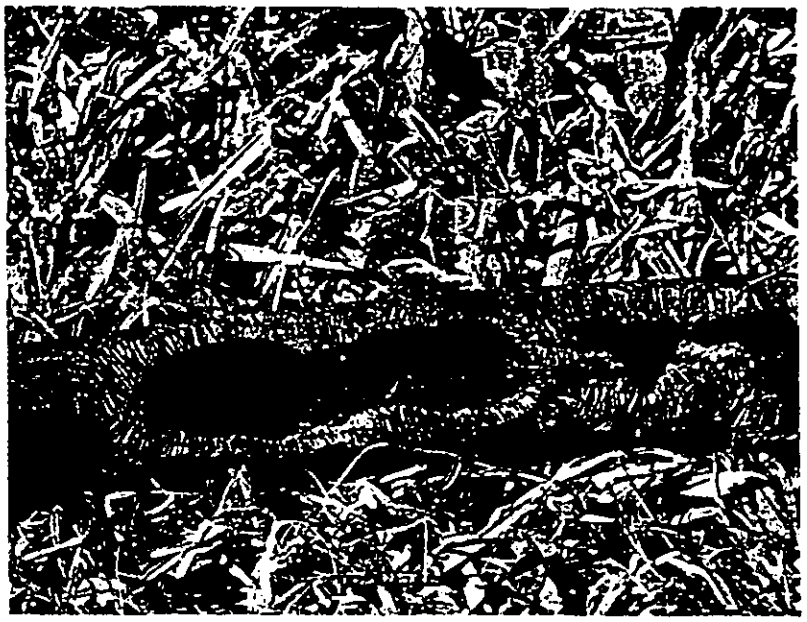
The second most significant problem area over all respondents was plastic glazing, being nominated by 26% as their worst problem area. Typically, poor weathering performance was given as the main reason for failure. This result is significant since the amount of plastic used in glazing (about 5% by weight for the major areas of plastics use in buildings[1]) is much less than for piping (about 70%[1]). Polymers with the highest percentage of total failures were

Responses From Each Occupation Grouping





Erosion of acetal caused by water leaking past a brass screw fitting.



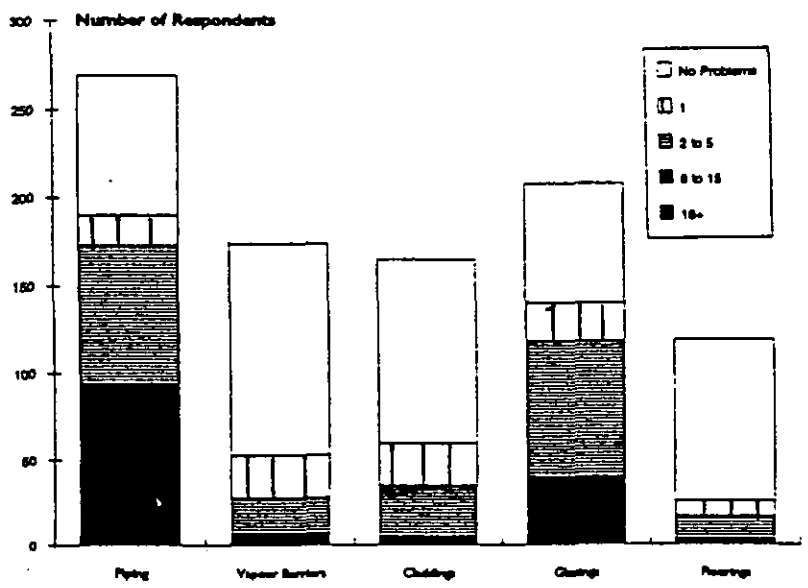
Plastic pipe gnawed by rats.

PVC (34%), polycarbonate (18%), glass reinforced polyester (13%) and acrylic (9%). These results confirm BRANZ's current research emphasis on the durability of plastic glazing and on polycarbonate glazing materials specifically. A programme of natural weather testing of polycarbonate materials began at BRANZ recently.

An area of plastics use not specifically mentioned in the survey questionnaire but chosen by 4% of respondents as their major problem area was mouldings and extrusions. These include rigid PVC wall jointers and finishing strips as used in wet areas or for large sheet exterior claddings. This result is significant since it ranks third, as a problem area, alongside vapour barriers. If it had been specifically mentioned by the survey questionnaire it may have ranked even higher. Failure was mainly as a result of cracking and breaking.

Over all areas, 31% of the cost of failures was due to faulty installation followed by 18% due to weathering. Some 60% of failures were caused by a plastic product cracking or breaking. Only 17% of products were deemed to have failed for aesthetic or appearance reasons.

Number of Problems Each Area of Plastics Use



We are able to make the following comments and conclusions about the results from the survey. In relation to piping problems the production of acetal crimp fittings has ceased except for one local manufacturer. Acetal fittings have been mainly replaced by metal fittings which should be more durable.

A recent BRANZ survey looked at a number of plumbing failures in the Nelson and Tasman regions. The conclusion drawn was that there is a high probability that in a domestic dwelling containing 30 acetal fittings, one of those fittings will fail every 10 years based on current failure rates.

While the incidence of problems with rigid PVC glazing seems quite high this must be balanced against its low cost. Manufacturers are providing more reasonable assessments as to the likely durability of their PVC glazing products. It is worth noting that rigid PVC performs better in terms of weathering when facing south than it does when installed in a roof or wall facing north towards the sun.

Little can be concluded about plastic mouldings and extrusions since 4% of respondents, although significant, still represents just 11 people. Installers should be aware however that the impact strength of rigid PVC does reduce at low temperatures.

1 Based on figures for the USA.

Neil Trebilco is a materials scientist with the Building Research Association of New Zealand.

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tics shape up?!/Building

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