

Some users report on radiant panel heating

Results of a survey among owners and renters in the Palo Alto, California, area, whose homes are equipped with radiant floor panel heating systems. Contained in a report, "Residents' Attitudes Toward Radiant Panel Heating and Concrete Floors," by Arthur Kroeger, Associate Professor of Marketing, Graduate School of Business, Stanford University.

IN THE LAST several years there has been a rather significant increase in the number of homes being constructed utilizing radiant panel heating systems. In order to provide some information to plumbing and heating contractors, concerning owners' likes and dislikes of such system of heating, or various features of it, a survey of users' attitudes toward radiant panel heating systems was conducted among occupants of homes with such systems in the Palo Alto, Calif., area. The study was conducted by sixteen graduate students in a class in Marketing Research at the Stanford Graduate School of Business, under the direction of the author. Specifically, the study was designed to determine not only the general opinion and attitude of users of radiant panel heating systems, but features of the system which they liked and disliked, including the concrete base for flooring, which in this instance was an integral part of the system.

Although this survey covered only one small area, certain aspects of the findings may well be indicative of general attitudes toward this method of heating.

The survey included a number of subdivisions consisting of homes with radiant panel heating located in, or in the vicinity of, Palo Alto, an area in which many new homes have been built since World War II, but a rather limited number of them with radiant panel heating. In most instances, such heating has been incorporated in all the homes in certain tracts developed by several builders in the area, with but very few custom homes. Consequently, all the interviews were made in tracts known to have incorporated this type of heating, in the medium to lower-medium price brackets. Of the 278 completed and occupied homes in the area, 249 completed interviews were obtained. Twenty-two were not completed because the owners could not be reached after three attempts had been made to obtain interviews, and eight occupants refused to grant interviews.

The "sample" used in this survey is thus obviously not a cross-section of the general population. It consists only of occupants (primarily owners) of homes

with radiant panel heating, and, even in this group, essentially only owners of homes in the medium and lower-medium price brackets. Obviously, this group studied is biased, to some extent at least, or they would not have purchased or rented homes utilizing such heating system. (This may not always be true, since some of the individuals involved may have purchased or rented in these particular subdivisions for various reasons despite the fact that radiant panel heating may not have been their first choice of types of heating.) It should also be noted that in all instances the homes were quite new. Although virtually all respondents were the original purchasers of the home from the builder, 49 per cent had lived in the house less than six months, 45 per cent from six months to a year, while only 6 per cent had lived in the house for over a year. Thus reactions to various features of the homes were still quite strong.

Of those interviewed, 148, or 59 per cent were women, and 101, or 41 per cent were men. (In no instances were two members of the same household interviewed.) An appreciable number of both sexes were interviewed in the belief that considerable differences in reactions to radiant panel heating and concrete flooring might exist between men and women. On the basis of the small sample interviewed in this study, such was not the case. In only a few isolated instances was there any appreciable difference in the responses of the sexes.

It should also probably be brought out that the sample used could not be

considered typical of the national population, for this particular area is one with a higher level of income and education than the national average, and it is quite probable that there are considerably more contemporary style homes with radiant panel heating in this area than is true nationally—which factor might influence or condition responses to some extent. The sample was also heavily weighted with younger married families, who again may have a more ready acceptance of non-traditional features of architecture and home construction.

General Attitude

The general attitude of the respondents was one of high regard for radiant panel heating. Ninety-five per cent of the people liked, while only 2 per cent disliked the heating system (with 3 per cent "don't know" replies). The "don't know" responses came from people who had just moved into their homes, and had not yet had sufficient experience with the system to form a definite opinion. The interesting thing was that the great majority of favorable responses were stated in a most enthusiastic manner, with such expressions as "We love it!", "It's wonderful!", or "It's out of this world!", being received frequently. Obviously, the people interviewed were for the most part very enthusiastically convinced of the merits of this system of heating.

As a further indication of attitude, 87 per cent said they would choose radiant panel heating if they were to buy or build a new home in the future, and 5 per cent said they would probably choose the same, while 4 per cent stated they would select some other type. (2 per cent responded "Don't know" and 1 per cent "No answer.") Thus 3 per cent of the group, although expressing a liking for radiant panel heating, would still select a different type of heating system in the future. However, certainly an overwhelming majority would prefer radiant panel heating in any future home they might buy or build.

In this realm of general opinion, it is interesting to note that 27 per cent stated that radiant panel heating was the *one* feature of their home which they liked *most*, but 33 per cent included "radiant panel heating" in their replies to the question, "What additional features do you particularly like?" (about their home in general).

Since two general questions were asked prior to any questions regarding radiant panel heating systems or concrete floors, no "conditioning" of respondents had occurred to influence their answers. Thus it is definitely indicated that, among this group, radiant panel heating would assume a place of considerable importance in the selection of a home to buy. In response to

the question as to what feature of the home they disliked most, only 4 of 1 per cent mentioned radiant panel heating.

What Features Are Liked?

"Even heat distribution" is regarded as the best feature of radiant panel heating by 44 per cent, or more than twice as many who named "warm floor for children" as their prime consideration. (It should be noted here that approximately 80 per cent of the interviewees had children in the home, with 68 per cent of the children being under six years of age. Hence the great stress on a warm floor for these young children, who normally spend a considerable period of time playing on the floor.) This latter advantage might well be combined with the response "floor warm—no cold feet," to indicate that about 27 per cent of the people believed that a warm floor was the chief advantage or best-liked feature of radiant panel heating. Other features assuming considerable significance were "cleaner—less dust," "not conscious of heat being on," "better all-round comfort," and the fact that the system "doesn't require attention." Other items mentioned only occasionally as being among the best-liked features of the system were "no radiators to burn children," "no grogginess—not stuffy," "no fumes," "no floor or wall ducts," and "no radiators or floor furnaces to clean."

What Features Are Disliked?

In response to the question "What do you dislike most about radiant panel heating?", 35 per cent stated that they had no real objections to the system, while 65 per cent did state objections or disliked certain features of the system. "Slow response" or "time lag to temperature changes" was the feature most disliked, being given by 33 per cent of the respondents. "High operating costs" was the only other feature of any great importance, being given by 10 per cent. Other disliked features

included the tendency for high floor heat to warp or melt rubber tile flooring, the fact that the use of this system of heating required concrete floors, "service problems" and "static condition of the air in the room."

Of some significance was the fact that not one of the respondents mentioned the hazard of leaks as a disliked feature, since in the area where this study was conducted, the hazard of leaks is a feature of radiant panel heating which the group conducting the study had often heard expressed as one of the chief objections to the system by people not living in homes with radiant panel heating. Probably this selected group used for the study had already been convinced that there was no real hazard of leaks, or they would not have purchased or rented homes incorporating radiant panel heating.

Since it had been anticipated that certain features of radiant panel heating would be criticized, or objected to, by respondents (and this was confirmed in the pre-test interviews), questions regarding such features were included in the questionnaire. One of these questions was, "How does your heating system respond to changes in temperature?". Sixty-two per cent of the respondents said their system responded satisfactorily, 10 per cent said it responded satisfactorily most of the time, while 20 per cent stated it did not respond satisfactorily, and 8 per cent said, "don't know."

A number of those who stated it responded satisfactorily did add that some anticipation of temperature change was required in order to obtain satisfactory results from the heating system. This evidence points up the need to educate buyers in the proper method of operating the system, which, for best results, is somewhat different than the operation of a forced warm air heating system.

In response to the question, "Do you find your heating system difficult to

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THESE WERE THE QUESTIONS ASKED — AND THE RESULTS (in percentages):

How do you feel about radiant panel heating for your home?

Like	94.78%
Dislike	2.01
Don't know	3.21

If you were to buy or build again, what type of heating system would you choose?

Radiant panel heating....	87.15%
Probably radiant panel heating	5.22
Other type heating.....	4.02
Don't know	2.41
No answer	1.20

What do you like most about radiant panel heating?

Even heat distribution..	43.78%
Floor warm for children	17.67
Cleaner—less dust	10.44
Floor warm—no cold feet	9.24
Not conscious of heating being on	6.43
Better all-round comfort	6.02
Doesn't require attention	4.82
Other features	12.85
Don't know80
No answer40

What do you dislike most about radiant panel heating?

No real objections	34.54%
Slow response—time lag	33.33
High operating costs	10.44
Floor too hot—tile warps or melts....	4.01
Concrete floors required	4.01
Service problems	2.81
Static condition of air..	2.00
Other objections	8.05
Don't know	2.41
No answer80

What do you like about concrete floors?

Easy to keep clean	25.30%
Nothing	16.87
Radiant heating	16.47
Quiet	7.63
Asphalt tile	5.62
Low maintenance cost....	5.62
Termite proof	5.62
No need for rugs	5.22
Other features	16.87
Don't know	19.04
No answer	5.22

What do you dislike about concrete floors?

Hard on feet	47.37%
Nothing	17.67
Asphalt tile, tile dents or scratches	15.66
Things break or children easily hurt....	11.65
Worry about cracks	5.62
Hard to clean	5.22
Usually eliminates hardwood	3.61
Other objections	11.73
Don't know	4.42
No answer	1.61

SUMMARY OF CONCLUSIONS:

The most important general findings of this survey were as follows:

1. The group studied was very enthusiastic over radiant panel heating.
2. The type of heating was of considerable significance to this group, 27% stating it was the feature of the house they liked most. (The homes were all of a contemporary architectural style and contained a number of unusual architectural features.)
3. The most significant merits of radiant panel heating to users are the "even heat distribution," "warm floors," and "cleanliness."
4. The most serious objections to radiant panel heating are "slow response" or "time lag" to temperature changes, with "high operating costs" being of some importance.
5. The majority of the respondents liked concrete floors, with the principal favorable features being "ease of keeping clean" and "because of radiant panel heating."
6. The chief objections to concrete floors are that they are "hard on feet" and "floor too hard."

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operate?" only 2 per cent replied "Yes," while 97 per cent stated "no." Hence the opinion of users is almost universal that the system is easy to operate (it is evident that a number of people believed slow response was an inherent difficulty or weakness of the system, and not a function of their operation of the system).

In view of the fact that all the heating systems in the homes included in the study were installed in concrete slab floors, it was believed of significance to determine the reaction to such floors. In response to the question "How do you feel about concrete floors in your home?", 63 per cent stated they liked concrete floors, 24 per cent said they disliked them, and 12 per cent said they "did not know." From the responses of the latter group it was evident that many of the owners had not given too much thought to the question of concrete floors (this was in large part probably due to the fact that the concrete floors are covered with asphalt or rubber tile; hence some of the people tend to think of an "asphalt tile floor"

or "rubber tile floor" rather than a "concrete floor").

The main item of interest here was the fact that 16 per cent of the "likes" liked concrete floors "because of the radiant heat." In addition, a number volunteered the information that they accepted concrete floors only because they were generally required in order to have radiant heating. The other most numerous reasons for liking concrete floors were "easy to keep clean" and "quiet," with other reasons that were given by 5 to 6 per cent of the people being "asphalt tile," "low maintenance costs," "termite proof," and "no need for rugs."

Principal objection to concrete floors was that they are "hard on the feet" and 47 per cent of the respondents gave this objection. Somewhat similar in nature to this dislike was that given by 12 per cent, that "things broke when dropped, or children hurt easily because the floor is too hard"; 18 per cent had no dislike or objections, but 16 per cent objected to the surfacing material. These people did not like asphalt or rubber tile, or stated that the tile dented and scratched too easily. With this group might be combined 4 per

cent who objected to concrete floors because it usually eliminated hardwood floors. (Hardwood floors have been used on concrete floor radiant panel heating homes in some subdivisions in the Palo Alto area, but not in any of the tracts included in this particular study.)

If these conclusions, which are valid for the small, localized and admittedly biased group studied, are at all indicative of general attitudes of interested people, the conclusions could be of considerable value to concerns installing radiant panel heating when formulating programs of approach to architects and builders as well as the home-buying public, and to builders who install, or contemplate installing, radiant panel heating systems.

No claims are made as to the universality of these findings. Even had the sample been selected on statistically sound bases in this area, it is questionable that it would be representative of the population of the United States.

It would be of considerable interest to compare the results of this survey with the results of any other similar studies which may have been conducted in other parts of the country.