MEMORANDUM

TO: NSF Joint Committee on Food Equipment

FROM: Steve Tackitt, Chairperson

DATE: May 9, 2008

SUBJECT: Proposed revisions NSF/ANSI 4 – Commercial cooking, rethermalization, and powered hot food holding and transport equipment (4i15r1)

On behalf of Mr. Jim Goranson, Issue Proponent, Draft 1 of NSF/ANSI 4 issue 15 is being forwarded to the Joint Committee for ballot. Please review the proposal and return your ballot by the ballot due date of May 30, 2008 via the NSF On-line Workspace.

Purpose

The purpose of this ballot is to allow the use of choke fingers on microwave/convection oven doors in the splash zone.

Background

Exposed Door Choke

A microwave oven generates a specific frequency of Radio Frequency (RF) energy. In order to contain this RF energy, the door of a microwave oven has to have a set of choke fingers. These fingers are metal tabs which run around the edge of the door and prevent the RF energy from leaking out around the sides of the door.

In a low power microwave oven, such as one in a household, these fingers are flat, that is to say, parallel with the oven door, and are behind a plastic cover.

In a high power microwave oven, it is more effective to have the choke fingers raised, and perpendicular to the door, extending partially inside the cavity of the oven. In a microwave-only application, these fingers are also behind a plastic cover.

In a high power microwave oven that is also a high temperature conventional oven, it is not feasible to have the fingers behind a plastic cover, as there are not any viable plastics that would be able to withstand the temperature of the oven, which is in excess of 500° F. High temperature materials that are available are not compatible with the door choke, and would allow the RF energy to leak out of the oven.

Therefore, as a practical design matter, it is necessary to have an exposed door choke in order to have a microwave oven that does not leak RF energy. There are several high power combination microwave/convection ovens on the market that have exposed door chokes.
**Structure**

The door choke structure substantially defines the inner area of the door weldment assembly. The door choke structure is primarily stainless steel sheetmetal formed in a generally rectangular shape, having 4 folded perimeter sides at a 4-5 degree positive draft angle and terminating approx 3/8” short of a second door surface that mates with the front of the oven cavity face when the door is in the closed position. The sides of the choke structure have a periodic geometric slot feature with the slot open nearest to the secondary surface (slot dimensioning is proprietary). When the door is closed the door choke protrudes into the cavity approx the depth of the perimeter side walls (approx 1”), but do not touch any of the 4 cavity side walls. Any time the oven is turned on and pre-heated, the door choke structure and surrounding metal surfaces are continuously exposed to temperature between 450 -- 520 deg F.

The door “choke fingers” are at the perimeter of the oven inner door and are made a sheet of stainless steel folded approximately 90 degrees to form a perimeter flange on the sides with slots cut into the folded flange forming fingers. These choke fingers are critical to the “choke’s” ability to suppress microwave energy.

**Door Choke Placement**

The placement of the door choke is critical on a high power microwave oven. During the construction process at the factory, the door choke is positioned on the oven door very precisely using special alignment tooling built for that purpose. The door is then also adjusted on the oven to ensure the door choke is properly placed in relation to the oven cavity when the door is closed.

If the door choke is out of alignment, it is very probable that the microwave oven will leak RF energy. This is both a violation of Federal Rules and Regulations (per FCC and CDRH), and a possible safety issue for the operator of the oven.

**Door Construction**

Given the above, it is the position of Amana Commercial Products that it is essential that the door of the microwave/convection oven be constructed as one solid piece through welding the door components together. This ensures that the door choke is placed exactly where it needs to be in order to contain the oven’s RF energy. In addition, welding provides the necessary continuous metal-to-metal contact between the choke fingers and the rest of the door which is nearly impossible to achieve with any sort of fasteners. This metal-to-metal contact is necessary to prevent RF energy leakage.

Admittedly, welding the choke fingers in place creates a gap behind the door choke fingers.

**Amana Cheetah Oven**
Amana Commercial Products is in the process of developing a new combination microwave/convection oven. For all of the reasons listed above, the door is being designed and built with an exposed door choke.

**Public Health Impact**

Adoption of this proposal will have no impact on public health.

If you have any questions about the technical content of the ballot, you may contact me in care of:

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