



U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

May 14, 1997

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EXEMPTED BY PETITION
RULE MAKING ADMIN. PROCDO
WITH PORTIONS REMOVED

Mr. Robert Stack
Standards Engineer
International Approval Services, Inc.
8501 East Pleasant Valley Road
Cleveland, Ohio 44131

Re: Review of Selected Investigation Reports Involving Vent
Disconnection from Gas-Fired Central Furnaces

Dear Mr. Stack:

In a letter dated October 29, 1996, the engineering staff of the Consumer Product Safety Commission (CPSC) recommended that Section 2.19 of the American National Standard for Gas-Fired Central Furnaces, ANSI Z21.47, be expanded to require appliance shutoff in the event that a vent pipe becomes disconnected. Staff believes that without coverage for disconnected vents, the vent safety shutoff system (VSSS) provisions in Section 2.19 are inadequate. These recommendations were discussed at the November 1996 meeting of the Central Furnace Subcommittee. At the meeting it was suggested that CPSC staff review a sample of relevant CPSC investigations for specific technical information requested by the subcommittee and share that information with the Technical Working Group (TWG) at the upcoming May 1997 meeting. CPSC staff agreed to perform the review, and work is underway.

Due to the seriousness of the hazard, staff is providing results of the investigations reviewed to date. CPSC engineering staff has completed a detailed review of 60 out of 143 selected CPSC investigation reports involving central furnaces which occurred from 1989 through 1996. The data is summarized on the enclosed four pages by investigation case number. The results indicate that the investigation reports contain much of the information requested by the subcommittee, although some detailed information was either not available or not recorded.

While the remaining 83 investigation reports will be reviewed, staff is very concerned that one-third (19) of the 60 cases reviewed involved disconnected vents, which resulted in 28 deaths and 33 injuries. The enclosed tables represent the individual cases reviewed to date. They are a subset of a convenience sample (i.e., not statistically selected) and may not be representative of all such incidents that occur. Also enclosed are purged copies of the 19 investigations reviewed

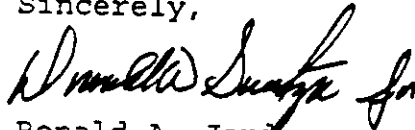
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involving disconnected vents.

The incident information reviewed thus far strongly suggests the need to extend VSSS coverage to address disconnected vents and positive pressure vents. Given the seriousness of these incidents, staff views ANSI Z21.47 to be deficient without VSSS coverage that addresses disconnected vent coverage on natural draft furnaces, as well as positive vent pressure units. CPSC staff strongly urges the TWG to develop the performance requirements necessary to remove this avoidable risk of CO poisoning and to have a draft proposal available to be presented at the September 1997 Central Furnace Subcommittee meeting. The engineering staff will provide a final review of the investigation reports to the Central Furnace Subcommittee by the end of July 1997.

This recommendation represents the position of the Commission staff. It has not been reviewed or accepted by the Commissioners. If you have any questions please call me at (301) 504-0508 extension 1295.

Sincerely,



Ronald A. Jordan
Project Manager, Fire/Gas Codes &
Standards
Directorate for Engineering Sciences

Enclosures

*19 Amalgam copies of investigation
provided under separate
cover.*

REVIEW OF SELECTED FURNACE INVESTIGATIONS INVOLVING DISCONNECTED VENT PIPES (1989-1996)
 Vent Failure Mode/Condition & Result

Investigation Case Number	Incident Date	Vent Failure Mode/Condition	CO exposure? (yes/no)	CO concentration (in ppm)	Number of Deaths	Number of Injuries	Total Number of Victims
950310CCCC2471	12/16/94	Disconnected vent	yes	69	0	0	0
960326CCCC6106	02/07/96	Disconnected vent	yes	unknown	2	0	2
960501CMC9017	04/11/98	Disconnected vent	no	unknown	0	0	0
940208CCCC2268	10/18/92	Disconnected vent	yes	268, 238, 180	1	0	1
940203CCCC3249	01/04/94	Disconnected vent	yes	0 to 14	5	5	10
940831HCC2218	11/28/93	vent or flarbox misaligned at draft diverter	yes	2000, 300	1	0	1
910208HCNO653	01/02/91	Disconnected (not attached)	yes	unknown	3	1	4
911004HCC2003	09/22/91	disconnected & blocked	yes	unknown	1	0	1
911112HCNO464	11/08/91	Disconnected	yes	200-300+	10	0	10
940107CEP9003	12/26/93	Disconnected vent	yes	unknown	0	1	1
930324CCC2284	01/23/93	Disconnected vent	yes	unknown	1	0	1
930225HWE5022	03/00/92	Disconnected vent	yes	unknown	0	1	1
921215HCNO481	11/24/92	Disconnected vent	yes	unknown	0	6	6
920110CCCC3172	11/01/91	Disconnected vent	no	unknown	0	0	0
920414HCNI506	03/09/92	Disconnected vent	yes	unknown	0	7	7
920204HCNO945	11/29/91	Disconnected vent	yes	unknown	0	2	2
921209HCNO460	12/07/92	Disconnected vent	yes	unknown	3	2	5
910222HCNO703	02/09/91	Misaligned flue/missing cover plate	yes	unknown	1	0	1
890228HCC1249	02/26/89	Disconnected vent	yes	3000	0	8	8
TOTALS					28	33	61

Note 1: Investigations were selected for review based on queries of Narrative field using keywords "Vent, Disconnect, and Separation" and "CO poisoning, Disconnect, and Separation". Product Code used was "310". Date Range was 01/01/87 through 12/31/96

Note 2: These investigations are a subset of a convenience sample (i.e. not statistically selected) of gas furnace-related incidents and may not be representative of all such incidents that occur. These investigations were chosen to illustrate the hazards associated with disconnected vent pipes and cannot be used to determine the relative frequencies of hazard patterns.

Source: CPSC investigations involving gas furnaces with disconnected vent pipes.

REVIEW OF SELECTED FURNACE INVESTIGATIONS INVOLVING DISCONNECTED VENT PIPES (1989-1996)

Description of Vent Failure Mode/Condition

Investigation Case Number	Description	Location of Vent Disconnect
950310CCCC2471	disconnected flue pipe	90 degree elbow
960326CCCC8106	vent pipe terminated at 1st floor ceiling	at ceiling
9605011CMC9017	HTPV vent pipe separated at elbow and cracked	90 degree elbow
940208CCCC2288	vent pipe fall apart	unknown
940203CCCC3249	3/4 in. gap b/w flue outlet/vent and	at flue outlet
940831HCC2216	corroded vent & recirculation of exhaust into intake	unknown
910208HCN0653	unit operated w/o vent attached	unknown
911004HCC2003	flue disconnected due to corrosion	unknown
911112HCN0464	Vent T separated 2.5 in.	flue outlet collar
940107CEP9003	exhaust vent was not connected during installation	flue outlet collar
930324CCCC2284	vent corroded and became separated 2 to 3 in. from chimney	flue outlet collar
930225HVVE5022	vent loosened & dislodged at coupling at chimney, leaving 4 in. gap	furnace outlet
921215HCN0491	duct tape connecting vent removed	entry point into chimney
920110CCCC3172	vent disconnected at flue outlet at top of furnace	unknown
920414HCN1506	vent separated at an elbow joint	flue outlet
920204HCN0945	vent left unconnected during maintenance	elbow
921209HCN0460	screws missing at points of separation	unknown
910222HCN0703	vent misaligned at flue outlet/combust. chamber plate not on unit	flue outlet & vertical vent pipe
890228HCC1249	disconnected vent connector	flue outlet
		b/w vertical section and elbow

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REVIEW OF SELECTED FURNACE INVESTIGATIONS INVOLVING DISCONNECTED VENT PIPES (1989-1996)

Investigation Case Number	Description of Vent	Vent Type	Vent Material	Connection Type	Fitting Type	Vent Configuration	Diameter (inches)	Length (feet)
9503100CC2471	single vent into chimney	single vent	galvanized steel	mechanical fasteners	90 degree elbow	unknown	unknown	unknown
960326CC6106	Single vent	Single vent	unknown	unknown	unknown	unknown	unknown	unknown
9605010CMC9017	Single vent	Single vent	plastic (HTPV)	adhesive/solvent	vent tee, 90 degree elbow	horizontal	unknown	unknown
9402080CC2288	single vent	single vent	plastic	unknown	90 degree elbow	horizontal & vertical	2	unknown
9402030CC3249	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
940831HCC2216	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
910208HGN0653	none attached	none attached	unknown	unknown	unknown	unknown	unknown	unknown
911004HCC2003	single vent	single vent	metal	mechanical fasteners & duct tape	90 degree elbow	horizontal & vertical	3	unknown
940107CEP9003	single vent	single vent	metal	mechanical fasteners, adhesive, metal pipe interface	tee fitting	horizontal & vertical	3	unknown
930324CC2284	unknown	unknown	unknown	unknown	tee fitting	horizontal & vertical	3	unknown
930225HVE5022	single vent into chimney	single vent into chimney	galvanized steel	unknown	unknown	horizontal	unknown	unknown
921215HCN0461	unknown	unknown	unknown	unknown	2- 90 degree elbows	horizontal	unknown	unknown
920110CC3172	unknown	unknown	unknown	duct tape in lieu of screws	coupling(?)	unknown	unknown	unknown
920414HCN1506	single	single	metal	unknown	unknown	unknown	unknown	unknown
920204HCN0945	unknown	unknown	plastic	adhesive	unknown	horizontal	unknown	unknown
921209HCN0460	common vent	common vent	unknown	unknown	elbow	horizontal	2	unknown
910222HCN0703	single	single	metal	screws	unknown	vertical	unknown	unknown
890228HCC1249	single vent into chimney	single vent into chimney	metal	not specified	flue connector	vertical	unknown	unknown
			metal	screws	not specified	vertical	unknown	unknown
			metal	screws	elbow	vertical & horizontal	4	unknown

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Source: CPSC investigations involving gas furnaces with disconnected vent pipes.

REVIEW OF SELECTED FURNACE INVESTIGATIONS INVOLVING DISCONNECTED VENT PIPES (1989-1996)
Description of Furnace

Investigation Case Number	Age of Furnace	Year Installed	Fuel Type	BTU Input Rating	Furnace Category	Furnace Configuration	VSSS? (yes/no)
950310CCC2471	13	unknown	natural gas	unknown	unknown	unknown	unknown
960326CCC6106	unknown	unknown	propane	unknown	unknown	unknown	unknown
960501CMC9017	3	1993	unknown	50,000	1"	horizontal	yes
940208CCC2268	unknown	unknown	LP-gas	60,000	unknown	unknown	unknown
940203CCC3249	unknown	1986-1988	natural gas	82,000	unknown	vertical	no
940831HCC2216	unknown	unknown	unknown	unknown	unknown	unknown	unknown
910208HCN0653	unknown	unknown	unknown	unknown	unknown	unknown	unknown
911004HCC2003	8	1982	unknown	unknown	unknown	unknown	unknown
911112HCN0464	2 months	unknown	unknown	unknown	unknown	Vertical, Uplow	unknown
940107CEP9003	17	1993	unknown	185,000	1"	unknown	no
930324CCC2284	10+	1978	LP-gas	100,000	unknown	unknown	unknown
930225HWE5022	29	unknown	natural gas	unknown	unknown	unknown	unknown
921215HCN0481	@15	unknown	natural gas	unknown	unknown	highboy	no
920110CCC3172	5	1987	natural gas	140,000	unknown	unknown	unknown
920414HCN1506	@15	1987	natural gas	50,000	unknown	unknown	unknown
920204HCN0945	@35	@1976	natural gas	137,500	unknown	unknown	unknown
921209HCN0460	@17	@1957	LP-gas	unknown	unknown	vertical	no
910222HCN0703	no specified	1974	LP-gas	unknown	unknown	not specified	no
890228HCC1249	no specified	no specified	natural gas	45,000	no specified	no specified	no

Note 1: Investigations were selected for review based on queries of Narrative field using keywords "Vent, Disconnect, and Separation" and "CO poisoning, Disconnect, and Separation"
Product Code used was "310". Date Range was 01/01/87 through 12/31/96

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