Report of the Committee on

Fixed Guideway Transit Systems

Frank J. Cihak, *Chair*
American Public Transit Assn., DC
Rep. Transit Development Corp., Inc

William R. Segar, *Secretary*
AEG Westinghouse Transportation Systems Inc., PA

Robert L. Aaron, Los Angeles City Fire Dept., CA
Bruce D. Anson, Rohm and Haas Co., PA
Melba Bayne, WA Metropolitan Area Transit Authority, DC
John F. Bender, Office of State Fire Marshal, MD
Rep. Fire Marshals Assn. of North America
Carmen J. Bianco, New York City Transit Authority, NY
David M. Casselman, Lea + Elliott Inc., TX
Ghislain M. Cote´, Montreal Urban Community Transit Corp. (STCUM),
Donald A. Diehl, Alison Control Inc., NJ
Rep. NFPA/RRS
David R. Fiedler, Rolf Jensen & Assn. Inc., TX
Richard G. Gewain, Hughes Assoc. Inc., MD
James P. Gourley, Nat'l Railroad Passenger Corp. (Amtrak), PA
Paul A. Hargrove, Seattle Fire Dept., WA
William T. Hathaway, U.S. Dept. of Transportation, MA
James R. Hoover, The DuPont Co., DE
Rep. Society of the Plastics Industry Inc
Jack Lasky, Okonite Co., NJ
Rep. Nat'l Electrical Mfrs. Assn.
Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd., BC
Lorne L. MacMonagle, General Electric Co., PA
Harry E. Newell, Cerberus Pyrotronics, NJ
Frank E. O'Dowd, Chicago Transit Authority, IL
Larry M. Romine, Schirmer Engineering Corp., TX
Richard B. Schiehl, Los Angeles Cnty Fire Dept., CA
Thomas J. Tanke, Parsons Brinckerhoff Quade & Douglas, CA
John J. Troy, FPC Sierra Inc., CA
Ralph S. Weule, Bay Area Rapid Transit Dist, CA
Joseph B. Zicherman, Integrated Fire and Failure Technologies Inc., CA

Alternate

A. J. Bartosic, Rohm & Haas Co., PA
(Alt. to B. D. Anson)
Arthur G. Bendelius, Parsons Brinckerhoff, NY
(Alt. to Parsons Brinckerhoff Quade Douglas Inc)
William R. Cioccio, AEG Westinghouse Transportation Systems Inc., PA
(Alt. to W. R. Segar)
Charles P. Elms, Lea + Elliott Inc., VA
(Alt. to D. M. Casselman)
Vincent Gallo, The Port Authority of NY & NJ, NJ
(Alt. to PA of NY & NJ)
Salvatore A. Gilardi, New York City Transit Authority, NY
(Alt. to C. J. Bianco)
Richard D. Gottwald, Society of the Plastics Industry, DC
(Alt. to J. R. Hoover)
Jonathan A. Hall, Los Angeles City Fire Dept., CA
(Alt. to R. Aaron)
James M. Howe, Schirmer Engineering Corp., VA
(Alt. to L. M. Romine)
Joseph F. Krempasky, Washington Metropolitan Area Transit Authority (WMATA), DC
(Alt. to M. Bayne)
Paul J. Lennon, Public Transit Assn., DC
(Alt. to F. Cihak)
John F. L. Lowndes, Mott MacDonald, **STATE**
(Alt. to H. A. Locke)
Robert Malanga, Rolf Jensen & Assoc., NJ
(Alt. to D. Fiedler)
Frederick L. Mead, Chicago Transit Authority, IL
(Alt. to F. E. O'Dowd)
Robert J. New, Los Angeles Cnty Fire Dept., CA
(Alt. to R. B. Schiehl)
Pierre Sigouin, Montreal Urban Community Transit Corp. (STCUM)
(Alt. to G. M. Cote´)
James M. Surless, The Long Island Rail Road, NY
(Alt. to D. Diehl)

Nonvoting

Norman H. Danziger, Parsons Brinckerhoff Quade Douglas Inc., NY
(Member Emeritus)
Edward K. Farrelly, E. Farrelly & Assoc., NJ
(Member Emeritus)

Staff Liaison: **Richard Ortisi-Best**

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

Committee Scope: This Committee shall have primary responsibility for documents on fire protection requirements for underground, surface, and elevated fixed guideway transit systems including trainways, vehicles, transit stations, vehicle maintainance and storage maintenance areas and for life safety from fire in transit stations, trainways, vehicles and outdoor vehicle maintenance and storage areas. Transit stations shall pertain to stations accommodating only passengers and employees of the fixed guideway transit systems and incidental occupancies in the stations.

The Report of the Technical Committee on **Fixed Guideway Transit Systems** is presented for adoption.

This Report was prepared by the **Technical Committee on Fixed Guideway Transit Systems** and proposes for adoption amendments to NFPA 130-1993, **Standard for Fixed Guideway Transit Systems.** NFPA 130-1993 is published in Volume 5 of the 1994 National Fire Codes and in separate pamphlet form.

This Report has been submited to letter ballot of the **Technical Committee on Fixed Guideway Transit Systems** which consists of 28 voting members. The results of the balloting can be found in the report.

(Log #3)

130-1 - (1-5 (New)): Accept in Principle

SUBMITTER: Ghislain M. Côté, Société de transport de la Communauté urbaine de Montréal

RECOMMENDATION: Add a new definition to read:

Butterfly Door. A double-panel swinging door with 2 panels joined on a common axes and positioned on an angle in the door opening such that the adverse reactions and train piston pressures are negated and safe, easy patron movement is achieved.

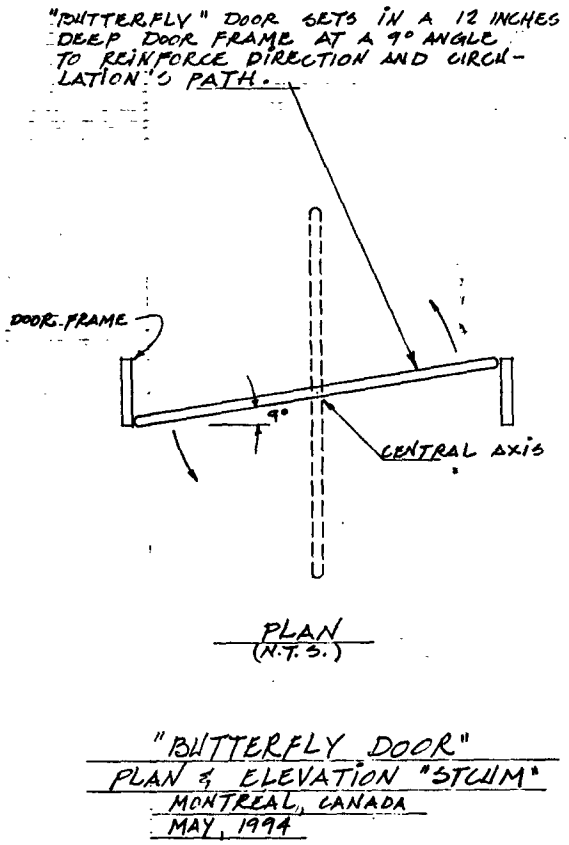
SUBSTANTIATION: The standard does not include this new door concept. This definition is also required for consistency with inclusion of references at the "butterfly" door in subsequent sections of the standard.

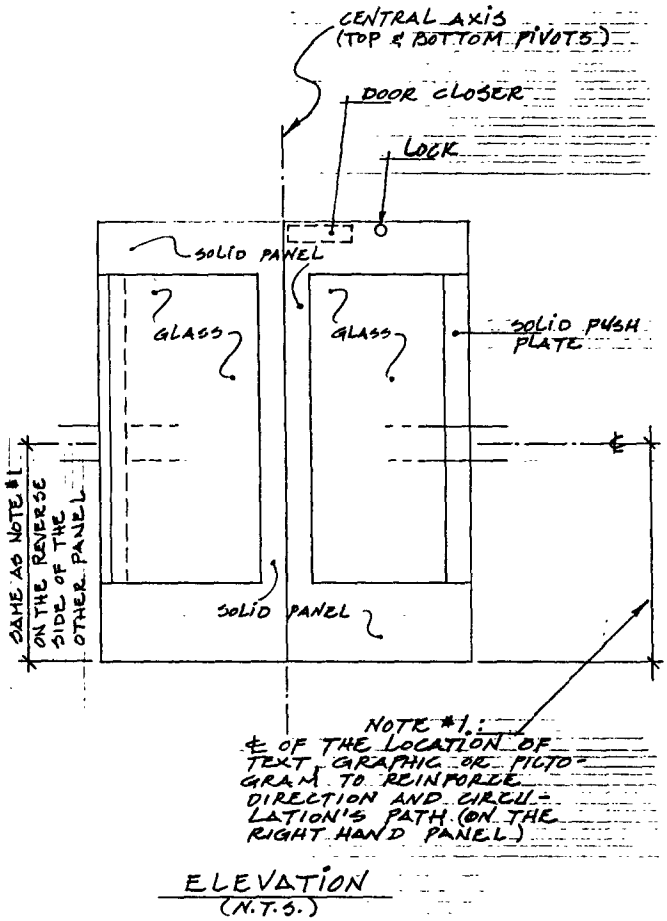
COMMITTEE ACTION: Accept in Principle.

Revise definition to read as follows:

Butterfly Door.* A single two-door panel that pivots vertically on a central axis. When closed, the door is set at an angle in a deep frame thus clearly indicating - the exit direction.

Also, add an asterisk following this title in definitions to indicate explanatory material on this subject in Appendix A. Add the following figure and text to Appendix A:





A-1-5 Butterfly Door. The butterfly door was developed to remedy the problems caused by significant variations in air pressure encountered in ventilation scenarios. The purpose of the vertical axis is to equalize air pressure on both sides of the door, thus eliminating resistance.

Add Figure A-1-5.

COMMITTEE STATEMENT: The Committee accepted other proposals to include the concept of butterfly doors in Chapter 2 in 2-5.3.7 and has therefore included a new definition as recommended by the submitter. The committee felt that language included in 130-34 (Log #4) by the same submitter was a better definition and used the last two sentences of that recommendation for the definition shown above. See also Committee Action on 130-17 (Log #2).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 17

NEGATIVE: Aaron, Gourley, Hargrove, New

NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

EXPLANATION OF NEGATIVE:

AARON: There isn't a need to provide a definition for an element that has not been accepted by NFPA 101, *Life Safety Code.*

NFPA 130, Chapter 2-5, Means of Egress, General states "...shall comply with the provisions of NFPA 101, *Life Safety Code*".

GOURLEY: The use of butterfly doors has not been approved by the 101 Life Safety Committee. While the transit environment does warrant unique methods of calculating exit capacity, times, etc., the transit environment does not warrant unique exit doors. While the problems that the proposer's agency is having with standard doors, due to the piston effect of the trains, can be appreciated, other agencies have addressed this effect with engineering solutions that do not require the use of butterfly doors. The committee should not provide code relief for what apparently is a problem unique to the proposer's agency.

HARGROVE: I believe that these doors are potentially dangerous for use as emergency exits.

They have not been tested, certified or accepted by any credible testing agency. Until this has been done they should be treated like a revolving door for purposes of calculating exit widths and locations.

NEW: There isn't a need to provide a definition for an element that has not been accepted by NFPA 101, *Life Safety Code*.

NFPA 130, Chapter 2-5, Means of Egress, General states "...shall comply with the provisions of NFPA 101, *Life Safety Code*".

(Log #5)

130- 2 - (1-5 Alternate Central Supervising Station): Reject
SUBMITTER: John F. L. Lowndes, Mott MacDonald Group
RECOMMENDATION: Delete.
SUBSTANTIATION: The Central Supervising Station is the nerve centre for controls and communications with trains, passengers, authority personnel, fire and rescue services. It contains controls for ventilation equipment that must be operated effectively within two minutes of a train fire report to ensure smoke free evacuation passages within tunnels and stations. The alternate station cannot quickly be equipped if the Central Supervising Station becomes inoperable or untenable. The alternate station must be equipped with essential controls and communications equipment, and be manned at the same times as the central station to deal with emergencies especially fire incidents.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-24 (Log #8).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #6)

130- 3 - (1-5 Central Supervising Station): Reject
SUBMITTER: John F. L. Lowndes, Mott MacDonald Group
RECOMMENDATION: Add text as follows:
"The Centre controls tunnel ventilation equipment for the control of smoke in the event of fire in below grade trainways to provide safe evacuation passages within tunnels and stations."
SUBSTANTIATION: The Central Supervising Station is the nerve centre for controls and communications with trains, passengers, authority personnel, fire and rescue services. It contains controls for ventilation equipment that must be operated effectively within two minutes of a train fire report to ensure smoke free evacuation passages within tunnels and stations. This facility is referred to in Cheater 2-3.4.5.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-24 (Log #8).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #28)

130- 4 - (1-5 Emergency Evacuation Period (New)): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, Washington Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Add the following definition:
Emergency Evacuation Period. That period of time required for patrons to evacuate the station from the most remote point on the platform to a point of safety in an emergency.
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometries. This new definition is necessary to effectively identify the emergency evacuation period relative to the site specific conditions and for consistency with subsequent revisions to the standard.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometrics. This new definition is necessary to effectively identify the emergency evacuation period relative to the site specific conditions and for consistency with subsequent revisions to the standard.
COTE: I vote on the ballot the same way that I vote at the meeting. To me, the life sustaining environment in an emergency evacuation must be included in the standard. I vote negatively where the committee reject proposal in that direction.

(Log #10)

130- 5 - (1-5 Life Sustaining Environment (New)): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, Washington Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Add the following definition:
Life Sustaining Environment. The atmospheric conditions within the station and trainways which must be maintained to support human life during normal operations and emergency evacuation periods.
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometries. This new definition is necessary to effectively identify those conditions which must be maintained for the duration of the emergency evacuation period relative to the site specific conditions and for consistency with subsequent revisions to the standard.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometrics. This new definition is necessary to effectively identify those conditions which must be maintained for the duration of the emergency evacuation period relative to the site specific conditions and for consistency with subsequent revisions to the standard.
COTE: See my explanation given on Proposal #130-4.

(Log #27)

130- 6 - (1-5 Nontransit Occupancy (New)): Accept in Principle
SUBMITTER: David M. Casselman, Lea + Elliott Inc.
RECOMMENDATION: Add the following definition:
Nontransit Occupancy. An occupancy of a higher or unknown hazard level, not under the control of the system operating authority.
SUBSTANTIATION: The term "nontransit occupancy" used in Sections 2-2.4.3 and 2-2.4.4 is not defined. Adding this definition would require the stated fire separation where greater hazards exist, but would not require the fire separation in cases where it is known that no greater hazard is present.
COMMITTEE ACTION: Accept in Principle.
Add a new definition as recommended, deleting "of a higher or unknown hazard level", so that revised definition reads as follows:
Nontransit Occupancy. An occupancy not under the control of the system operating authority.
COMMITTEE STATEMENT: The Committee agreed with the Submitter, but did not feel that the language deleted would help to identify cases where no greater hazard was present.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #30)

130- 7 - (1-5 and 2-5): Reject
SUBMITTER: Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd.
RECOMMENDATION: 1. Add new definitions to 1-5 as follows:
Egress Capacity. Means the number of people able to exit either from a given area or through a given egress route in a specified period of time expressed as pedestrians per minute. The egress capacity for a type of egress facility is expressed as either:
• pedestrians per minute for a given area, a given egress route, and devices such as fare gates, or

• millimeters (inches) per pedestrian per minute for types of egress facilities such as corridors, ramps and stairways.

Entraining Load. Means the number of passengers waiting to board the train at a platform.

Train Load. Means the number of passengers on board a train as it arrives at a platform.

Maximum Train Capacity. Means the maximum occupant capacity per car multiplied by the maximum number of cars per train in the peak period for the design year.

Peak Direction. Means, for each route, the direction of train travel having the largest passenger flow volume based on the sum of the upcoming train load plus the entraining load per peak hour.

2. Revise 2-5 as follows:

2-5 Means of Egress.

2-5.1 General. To provide minimum criteria for design of egress facilities, a station shall comply with the provisions of NFPA 101, Life Safety Code, Chapters 8 and 9, "New and Existing Assembly Occupancies," except as herein modified.

2-5.1.1 For a station, the design of the means of egress shall be based on an emergency condition on a train arriving at the station and requiring evacuation of the incident train and station occupants to a point of safety.

2-5.2 Occupant Load.

2-5.2.1 The required egress capacity in stations shall be based on evacuation of the platform occupant load calculated in accordance with Subsection 2-5.2.5, except as noted in 2-5.2.4.

2-5.2.2 The basis for calculating the platform occupant load shall be the peak hour patronage figures as projected for design of a new transit system or as established by survey for an operating system.

2-5.2.2.1 Special consideration shall be given to stations servicing areas where events occur that establish occupant loads not included in normal passenger loads. These would include such areas as civic centers, sports complexes, and convention centers. Consideration of control of access to platforms may be necessary to provide the appropriate level of safety.

2-5.2.3 At multi-platform stations each platform shall be considered separately. At each platform, the arrival of trains from all normal traffic directions plus entraining loads shall be considered. Egress from concourses, mezzanines, or multilevel stations shall be designed to accommodate simultaneous loads for all egress routes passing through that area.

2-5.2.4 Where an area within a station is intended for use by other than transit patrons or employees, the occupant load for that area shall be determined in accordance with the provisions of NFPA 101, as appropriate for the class of occupancy. That additional occupant load shall be included in determining the required egress from that area.

2-5.2.5 Calculation of Platform Occupant Load. The platform occupant load for each platform in a station shall be the greater of the peak period loads calculated as follows:

2-5.2.51 The peak period occupant loads for each platform shall be based on the simultaneous evacuation of the entraining load and the train load for that platform, and shall be calculated for each of the periods having:

(a) the highest entraining flow, and

(b) the highest detraining flow.

2-5.2.5.2 The entraining load for each platform shall be the sum of the entraining loads for each track serving that platform and the entraining load for each track shall be based on the entraining load per train headway multiplied by:

(a) a factor of 1.3 to account for surges, and

(b) in the peak direction for each route, an additional factor of 2 to account for one missed headway.

2-5.2.5.3 The train load for each platform shall be the sum of the train loads for each track serving that platform and, except as noted in 2-5.2.5.4, the train load for each track shall be the train load per train headway multiplied by:

(a) a factor of 1.3 to account for surges, and

(b) in the peak direction for each route, an additional factor of 2 to account for one missed headway.

2-5.2.5.4 The maximum train load at each track shall be the maximum train capacity.

2-5.2.5.5 Surge and headway factors other than those specified in 2-5.2.5.2 and 2-5.2.5.3 may be used where justified by conditions specific to the design system.

2-5.3 Number and Location Means of Egress.

2-5.3.1 Each platform in a station shall be served by not less than 2 means of egress which are independent of and remote from each other.

2-5.3.2 Means of egress from platforms shall be located so that:

(a) the travel time from the most remote point on a platform to a means of egress either fire separated from the platform or protected in accordance with 2-3.1 through 2-3.3 does not exceed 4 minutes based on travel speeds as follows:

1. 38.1 m (125 ft)/minute for horizontal travel,
2. 11.9 m (39 ft)/minute for vertical rise, and

(b) platform areas having access to a means of egress in one direction only shall not exceed 6.1 m (20 ft) in length.

2-5.4 Capacity and Width of Means of Egress.

2-5.4.1 Platform Clearance Time. Where the means of egress from platforms are protected by fire separation or in accordance with 2-3.1 through 2-3.3, the required platform clearance time shall be 4 minutes.

2-5.4.1.1 Where the first portion of a means of egress serving a platform is not protected as described in 2-5.4.1:

(a) the longest travel time from the point of leaving the platform to a protected portion of a means of egress shall be calculated based on travel speeds listed in 2-5.3.2, and

(b) the required platform clearance time shall be adjusted by subtracting the travel time described above from 4 minutes.

2-5.4.2 Required Capacity. For a station, the required aggregate egress capacity from each platform shall be determined by dividing the platform occupant load determined in accordance with 2-5.2.5 by the required platform clearance time determined in accordance with 2-5.4.1.

2-5.4.2.1 For each means of egress the required egress capacity at the platform shall be maintained for the entire length of the means of egress.

2-5.4.2.2 Where 2 or more means of egress converge, the required egress capacity beyond that point shall be the sum of the required egress capacities of each of the converging routes.

2-5.4.3 Width Based on Required Capacity. Except as otherwise required in this subsection, the required width of means of egress serving platforms in stations shall be determined by dividing the required egress capacity determined in conformance with 2-5.4.1 by the pedestrian flow rate for the type of means of egress facility to be provided as listed in Table A.

Table A
Forming Part of 2-5.4.3

Type of Egress Facility	Capacity (pedestrians/minute)	Pedestrian Flow Rate [mm (in.)/pedestrian/minute]
Platforms	N/A	12.7 (0.5)
Corridors	N/A	12.7 (0.5)
Ramps: not more than 4%	N/A	12.7 (0.5)
Ramps: more than 4%	N/A	17.8 (0.7)
Stairs	N/A	17.8 (0.7)
Escalators (measured @ hip level)	N/A	17.8 (0.7)
Doors: 900 mm minimum width	N/A	12.7 (0.5)
Gates: 900 mm minimum width	N/A	12.7 (0.5)
Fare Collection Gates	50	N/A
Turnstiles: 900 mm maximum height of bar	25	N/A
Column 1	Column 2	Column 3

2-5.4.3.1 In calculating the required width of corridors and ramps with a grade of less than 4 percent, 0.3 m (1 ft 0 in.) shall be added at each sidewall to the width determined based on required egress capacity.
2-5.4.3.2 In calculating the required width of platforms serving as part of the means of egress, 450 mm (1 ft 6 in.) shall be added at each platform edge to the width determined based on required egress capacity.
2-5.4.3.3 The width of egress routes shall be based on the clear width measured at the narrowest point except that handrails may project 90 mm (3 1/2 in.) into the required width.
2-5.4.3.4 In calculating the required width of egress routes,
(a) escalators shall not comprise more than one-half of the required egress capacity from any one level, and
(b) one escalator at each station level shall be deemed to be out of service and not available for egress purposes.
2-5.4.3.5 Emergency exit gates in accordance with NFPA 101 shall be provided for at least 50 percent of the required emergency egress capacity unless fare collection equipment provides unobstructed egress under all conditions.
2-5.4.4 Minimum Width Requirements. Except as provided in Section 2-5.4.3.1, the minimum width of means of egress facilities serving platforms shall be:
(a) 1730 mm (5 ft 8 in.) for corridors and ramps,
(b) 1730 mm (5 ft 8 in.) for stairs,
(c) 900 mm (3 ft 0 in.) for doors and gates,
(d) 450 mm (1 ft 6 in.) for turnstiles,
(e) 500 mm (1 ft 8 in.) for fare collection gates, and
(f) 600 mm (2 ft 0 in.) measured at hip level for escalators.
2-5.4.4.1 A second means of egress as required by Section 2-5.3.1 is permitted to be less than 1730 mm (5 ft 8 in.) wide but not less than 1100 mm (3 ft 8 in.) wide.
2-5.4.4.2 The minimum unobstructed width of platforms measured from the platform edge shall be 2500 mm (8 ft 2 in.).
2-5.5 Additional Requirement Types of Egress Facilities.
2-5.5.1 Escalators. Escalators forming part of the required means of egress shall be designed as follows:
2-5.5.1.1 Escalators equipped to run reverse to the direction of egress travel shall be capable of being stopped remotely and locally. Such escalators shall be provided with visual surveillance at the remote location and activation of the remote stopping device shall be preceded by a warning announcement and a visual warning signal.
2-5.5.1.2 If escalators are exposed to the outdoor environment, the landing and floor plates shall have a nonslip surface and, if they also are exposed to freezing temperatures, the landing and floor plates and steps shall be heated to keep those areas free of ice and snow.
2-5.5.1.3 Escalators used as a means of egress shall be constructed of noncombustible materials.
2-5.5.2 Fare Collection Gates or Turnstiles. Where gates or turnstiles used for fare collection are intended to be used as part of a required means of egress from a station, provision shall be made to release the gates or turnstiles in accordance with Section 2-5.5.2.1, to allow them to operate freely in the direction of egress travel.
2-5.5.2.1 The release device required in Section 2-5.5.2 shall be installed as an ancillary device to the fire alarm system and shall release immediately:
(a) upon activation of the fire alarm signal,
(b) in the event of a power failure or ground fault, or
(c) upon actuation of a manually operated switch accessible to authorized personnel and located at:
1. a designated location in the station, or
2. the central supervising station.
2-5.5.2.2 After release, the gates or turnstiles in Section 2-5.5.2 shall be capable of reactivation only by manual actuation of the switch in Clause 2-5.5.2.1(c).
2-5.5.2.3 Fare collection gates or turnstiles shall be designed so that their failure to operate properly will not prohibit movement of passengers in the direction of emergency egress.
SUBSTANTIATION: The NFPA 130 Standard does not reflect current knowledge and practices with respect to determination of means of egress requirements as follows:
• The Standard specifies egress calculations on the basis of exit lanes (i.e., unit widths of 22 in. or 558.8 mm) whereas other North American "Codes" - including NFPA 101 - have moved to the use of incremental widths,
• The pedestrian flow volume rates specified for each exit lane are too high according to research published in J.J. Fruin's book "Pedestrian Planning and Design" (see Table), and
• The pedestrian travel speeds specified for each type of egress facility are also too high according to Mr. Fruin's research which suggests that travel speeds are a function of pedestrian congestion levels and should therefore be linked to the specified pedestrian flow volume rates (see Table).

COMPARISON OF PEDESTRIAN FLOW VOLUME RATES AND TRAVEL SPEEDS

Type of Egress Facility	NFPA 130	Fruin LOS F(a)	NFPA 101(b)
Stairways - Up	62.6 PMM	55.8 PMM	37.5 PMM
	15.2 mpm	11.9 mpm	N/A
Stairways - Down	71.5 PMM	55.8 PMM	37.4 PMM
	18.3 mpm	11.9 mpm	N/A
Walkways (c)	89.5 PMM	82.0 PMM	56.2 PMM
	61.0 mpm	37.7 mpm	N/A

Notes: PMM - people/metre/minute
mpm - metres/minute (vertical distance)
N/A - not applicable

(a) LOS F - Level of Service F. According to Fruin, this is the maximum achievable flow rate and corresponding travel speed for each type of egress facility.
(b) NFPA 101 pedestrian flow volume rates are provided as a comparison.
(c) For walkways, each document specifies a buffer "zone" (which is not counted as contributing to egress capacity) at each corridor sidewall as follows:
• NFPA 130 - 304.8 mm (1 ft 0 in.)
• Fruin - 457.2 mm (1 ft 6 in.)
• NFPA 101 - 0 mm (0 ft 0 in.)

To conform to the standard format used in other North American "Code" documents - including NFPA 101 - the NFPA 130 Standard should have all requirements pertaining to the calculation of required egress capacity included in the main text.
The information included in the text requires some reorganization:
• to group all requirements pertaining to one subject, and
• to improve identification of categories of information.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: Committee Action was to temporarily reject this recommendation because of insufficient time in this revision cycle to address and fully define the means of egress issues in standard format. The importance of a revised section on means of egress is recognized by the Committee and a Task Group appointed by the Chairman has been working on major revisions to egress requirements since before the 1993 edition of NFPA 130.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #31)

130- 8 - (2-2): Accept
SUBMITTER: Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd.
RECOMMENDATION: Revise text as follows:
1. Change title to read "2-2 Construction."
2. Subdivide text in the Section under 3 Subsection headings as follows:
"Construction Materials."
"Safeguards During Construction," and
"Compartmentation and Fire Separation."
SUBSTANTIATION: 1. The section covers other aspects of construction besides just materials.
2. The suggested Subsection headings more clearly delineate the information contained in this section.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #34)

130- 9 - (2-2.4.3, 2-2.4.4, 3-4.6): Reject
SUBMITTER: Jim Fletcher, A CE-Automated People Movers
RECOMMENDATION: Specific Sections of NFPA 130 that we would propose changes to are as follows:
Section 2-2.4.3
Current: All station public areas shall have a fire separation of at least three hours from all nontransit occupancies. The fire separation for aboveground stations may be modified based on an engineering analysis of potential fire exposure hazards.
Proposed: The fire separation of all stations from adjacent occupancies shall be based on an engineering analysis of potential fire exposure hazards.
Section 2-2.4.4
Current: All openings . . . may be by fusible links.
Proposed: The fire separation of all stations from adjacent occupancies shall be based on an engineering analysis of potential fire exposure hazards.
Section 3-4.6
Current: Egress for Passengers. The transit system shall incorporate a walk surface or other suitable means for passengers to evacuate a train at any point along the trainway so that they can either proceed to the nearest station or wait for an evacuation train to arrive. System egress points shall be illuminated.
Proposed: The transit system shall incorporate suitable means for passengers to evacuate a vehicle at any point along the guideway. Consideration shall be given to the timely emergency evacuation from the vehicle to the ground using emergency equipment considering the fire potential, the fire separation and fire suppression on the vehicle.
SUBSTANTIATION: Justification: Fixed guideway transit systems are quite variable in design with some systems not increasing potential of fire within an occupancy. If fire-starting and fire sustaining sources on or within the vehicle are appropriately addressed, then separation of the vehicle from its surroundings does not detract from or enhance the fire safety of the surroundings. Conversely, the means by which people move through a facility or activity center does not necessarily detract from or enhance the fire safety of the people within the vehicle.
Justification: This provides guidance without suggesting a walkway along the guideway. For some guideways such as ropeways or monorails, walkways become very difficult to execute without necessarily increasing the safety of the system.
NOTE: Section 4-5.2 could also be appropriate for this Section as it states, "A means to allow passengers to evacuate the vehicle safely (delete safely) to a walk surface or other suitable area under the supervision of authorized employees in case of an emergency shall be provided."
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The Committee determined that the first two items have already been accommodated by the standard, and the committee judged the third item to not be an appropriate change in NFPA 130.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #7)

130- 10 - (2-3 and 3-2.2): Reject
SUBMITTER: John F. L. Lowndes, Mott MacDonald Group
RECOMMENDATION: Delete sections 2-3 and 3-2.2.
SUBSTANTIATION: These sections should be grouped together and expanded in a separate chapter on Ventilation, Smoke Control by ventilation, requires a comprehensive approach covering tunnel trainways and below grade stations to provide safety for passengers evacuating to a safe refuge on to the surface.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-24 (Log #8).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #11)

130- 11 - (2-3.2(c)): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Add to the existing text:
"For the duration of the emergency evacuation period at a minimum."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: It is essential to safe patron emergency evacuation that the 140°F not be exceeded for the duration of the emergency evacuation period. This addition to the text will ensure the appropriate environmental conditions are met for that duration.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 18
NEGATIVE: Bayne, Cote, Gourley
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
GOURLEY: While the standard implies that safe temperatures must be maintained, the addition of this wording will reinforce the necessity of maintaining safe temperatures for the duration of the evacuation period.
BAYNE: It is essential to safe patron emergency evacuation that the 140°F not be exceeded for the duration of the emergency evacuation period. This addition to the text will ensure the appropriate environmental conditions are met for that duration.
COTE: See my explanation given on Proposal #130-4.

(Log #12)

130- 12 - (2-5.3.2): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Revise the first sentence as follows:
"There shall be sufficient patrol travel lanes within the station to efficiently satisfy patron needs/movement under normal operating conditions and in concert with the emergency ventilation system to evacuate the station occupant load as defined in 2-5.2.1 from the station to a point of safety in a life sustaining environment.
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometries. Thus the present time requirements for exiting from the platform and station (4 and 6 minutes respectively) do not accurately reflect site specific evacuation times. New technology can now identify the site specific conditions-combustible load, geometry and emergency ventilation capabilities required to provide a life sustaining environment for the duration of the emergency evacuation period based on patrol travel lanes which satisfy efficient patron movement under normal operating conditions.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The current wording of paragraph 2-5.3.2 does not recognize that the use of fire protection measures including emergency ventilation can provide additional time for the safe evacuation of the station occupant load from platforms. See new exception to this paragraph in 130-13 (Log #CP1). The exception provides the option of an engineering analysis to provide a level of safety commensurate with this standard.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometrics. Thus the present time requirements for exiting from the platform and station (4 and 6 minutes respectively) do not accurately reflect site specific evacuation times. New technology can now identify the site specific conditions-combustible load, geometry and emergency ventilation capabilities required to provide a life sustaining environment for the duration of the emergency evacuation period based on patron travel lanes which satisfy efficient patron movement under normal operating conditions.
COTE: See my explanation given on Proposal #130-4.

(Log #CP1)

130- 13 - (2-5.3.2 Exception, 2-5.3.3): Accept
SUBMITTER: Technical Committee on Fixed Guideway Transit Systems,
RECOMMENDATION: Add an exception to 2-5.3.2 as follows:
Exception: Modification of the above evacuation time shall be permitted based on an engineering analysis by evaluating material heat release rates, station geometrics, and emergency ventilation systems.
Add the same exception following the first sentence in 2-5.3.3 and make the second sentence of 2-5.3.3 new 2-5.3.1, as follows:
2-5.3.3 The station also shall be designed to permit evacuation from the most remote point on the platform to a point of safety in six minutes or less.
Exception: Modification of the above evacuation time shall be permitted based on an engineering analysis by evaluating material heat release rates, station geometrics, and emergency ventilation systems.
2-5.3.3.1 In at-grade or elevated structures so designed that the station platform is open to the elements and, where the concourse is below or protected from the platform by distance or materials as determined by an appropriate engineering analysis, that concourse may be defined as a point of safety.
SUBSTANTIATION: The current wording of paragraphs 2-5.3.2 and 2-5.3.3 does not recognize that the use of fire protection measures including emergency ventilation can provide additional time for the safe evacuation of the station occupant load from platforms. The Committee discussed this limitation while considering 130- (Log #12) and felt that exceptions to each paragraph would provide the option of an engineering analysis to provide a level of safety commensurate with this standard.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 18
NEGATIVE: Aaron, New, Troy
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
AARON: The EXCEPTIONS for 2-5.3.2 and 2-5.3.3 are not justified as they are repeating what has already been stated in Chapter 1 - Scope: "...new methods, materials, or devices, provided sufficient technical data is presented..."
Additionally, there isn't a sufficient "base-line" or "measurement" of what is acceptable. The proposed change says that and EXCEPTION SHALL be given once data has been presented. This doesn't allow the AHJ to make the decision.
NEW: The EXCEPTIONS for 2-5.3.2 and 2-5.3.3 are not justified as they are repeating what has already been stated in Chapter 1 - Scope: "...new methods, materials, or devices, provided sufficient technical data is presented...
Additionally, there isn't a sufficient "base-line" or "measurement" of what is acceptable. The proposed change says that and EXCEPTION SHALL be given once data has been presented. This doesn't allow the AHJ to make the decision.
TROY: Until such time as criteria for evaluating the factors used in the exception are added to the standard I believe it is premature to allow the exception.

(Log #13)

130- 14 - (2-5.3.3): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Delete the first sentence only which reads:
"The station also shall be designed to permit evacuation from the most remote point on the platform to a point of safety in six minutes or less."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometries. Thus the present time requirements for exiting from the platform and station (4 and 6 minutes respectively) do not accurately reflect site specific evacuation times. New technology can now identify the site specific conditions-combustible load, geometry and emergency ventilation capabilities required to provide a life sustaining environment for the duration of the emergency evacuation period based on patron travel lanes which satisfy efficient patron movement under normal operating conditions.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not acknowledge the varying combustible loads as related to the varying geometrics. Thus the present time requirements for exiting from the platform and station (4 and 6 minutes respectively) do not accurately reflect site specific evacuation times. New technology can now identify the site specific conditions-combustible load, geometry and emergency ventilation capabilities required to provide a life sustaining environment for the duration of the emergency evaluation period based on patron travel lanes which satisfy efficient patron movement under normal operating conditions.
COTE: See my explanation given on Proposal #130-4.

(Log #14)

130- 15 - (2-5.3.4.2): Accept
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Revise to read:
"Escalators shall not account for more than 80 percent of the units of exit for the purposes of existing calculations."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The 50 percent designation currently stated in the standard is without documented substantiation, thus unnecessarily increases construction costs of transit stations. The escalators and stairs should be designed to efficiently move patrons through the transit station. The available escalators - based on acknowledgment of maintenance and failure (downtime) - in combination with other available exit lanes and an appropriately designed ventilation system shall be numerically sufficient to provide safe patron evacuation for the duration of the emergency evacuation period. A survey of major transit properties in the U.S. (Miami, Atlanta, San Francisco, Washington, D.C., Los Angeles, Chicago and New York) substantiates that all maintain 98 percent plus availability except New York and Chicago which maintain 93 percent and 95.5 percent availability respectively.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 14
NEGATIVE: Aaron, Fiedler, Gourley, Hargrove, New, Troy, Weule
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
AARON: The only portion of this proposal that I can agree with is in the first sentence ...The 50 percent designation currently stated is without documented substantiation...
There is little, or no reason to increase from 50 percent to 80 percent the allowance for escalators. There hasn't been any documentation substantiated to agree with the presenter that 80 percent escalators is safer that 50 percent. As a matter of fact, the only substantiation was that it was costly. In the building of the LA Metro Rail, the current requirements were followed with positive results, and the cost of stairs were far less expensive than escalators.
GOURLEY: While the unique exiting requirements of transit operations are appreciated, no information was presented that addressed the capacity of stopped escalators under emergency evacuation conditions. It is assumed that the 101 Life Safety Committee addressed this issue. The reasons why escalators are not recognized by the Life Safety Committee should be addressed in relation to the unique exiting problems of the transit environment.
HARGROVE: This is a major change that lacks adequate documentation and testing. At the present, we are at an arbitrary 50%. Why make any changes without a solid block of supporting rationale? Tread rise and fall doesn't meet any exiting requirements yet we are saying here that we will count escalators as nearly a required exit width. I believe 80% is excessive.
NEW: The only portion of this proposal that I can agree with is in the first sentence ...The 50 percent designation currently stated is without documented substantiation...
There is little, or no reason to increase from 50 percent to 80 percent the allowance for escalators. There hasn't been any documentation substantiated to agree with the presenter that 80 percent escalators is safer than 50 percent. As a matter of fact. The only substantiation was that it is too costly. In the building of the LA Metro Rail, the current requirements were followed with positive results, and the cost of stairs were far less expensive than escalators.

TROY: The use of the 50 percent limit was based on factors including more than downtime. Further the measurement of downtime does not seem to include all conditions which make escalators unusable for emergency egress. Most exiting methods do not allow any use of escalators and this would push the limit of credibility.

FIEDLER: No data to justify changing the current percentage was provided to the committee. The survey cited overall availability of the machinery but not the ranges. Since availability of escalators is not 100 percent, some must fail and not be available for exiting.

WEULE: The standard allows for half of the units of exit at any one level. This recognizes the use of escalators in exiting calculations. Increasing this recognition to 80% is not appropriate based on availability/reliability statistics. Major failures, parts shortages and periodic rehabilitation may cause any individual escalator to be out of service for extended periods. The standard should remain at the current level of half of the units.

(Log #1)

130-16 - (2-5.3.7 (New)): Accept in Principle
SUBMITTER: Ghislain M. Côté, Société de transport de la Communauté urbaine de Montréal
RECOMMENDATION: Add new text:
"Butterfly door (see also Appendix C-3)."
SUBSTANTIATION: Under Section 1-1.3 of NFPA 130, 1990 edition, the STCUM proposed to revised Section 2-5 of NFPA 130 in order to include the butterfly door as a recognized means of egress in underground subway systems.

The movement of subway trains through the tunnels creates significant changes in air pressure that adversely effect the street-level doors of enclose station entrances. This "piston-effect" creates extreme difficulty and potential danger for people when attempting to open conventional doors being subject to piston effect.

To remedy the problem, a new "butterfly" door was designed for enclosed stations entrances to negate the adverse effect of piston pressures and provide safe, easy patron movement through the door at all times.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE STATEMENT: See Committee Action on 130-17 (Log #2).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 17
NEGATIVE: Aaron, Gourley, Hargrove, New
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
AARON: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

GOURLEY: The use of butterfly doors has not been approved by the 101, *Life Safety Committee*. While the transit environment does warrant unique methods of calculating exit capacity, times, etc., the transit environment does not warrant unique exit doors. While the problems that the proposer's agency is having with standard doors, due to the piston effect of the trains, can be appreciated, other agencies have addressed this effect with engineering solutions that do not require the use of butterfly doors. The committee should not provide code relief for what apparently is a problem unique to the proposer's agency.

HARGROVE: I believe that these doors are potentially dangerous for use as emergency exits.

They have not been tested, certified or accepted by any credible testing agency. Until this has been done, they should be treated like a revolving door for purposes of calculating exit widths and locations.

NEW: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

(Log #2)

130-17 - (2-5.3.7.1 (New)): Accept
SUBMITTER: Ghislain M. Côté, Société de transport de la Communauté urbaine de Montréal
RECOMMENDATION: Add new text to read:
"Butterfly doors as designed for enclosed station entrances shall be acceptable in both primary and emergency exits."
SUBSTANTIATION: Same as new 2-5.4.7.
COMMITTEE ACTION: Accept.
Make the new paragraph 2-5.3.7 to read as follows:
2-5.3.7 Butterfly Doors. Butterfly doors as designed for enclosed station entrances shall be acceptable in both primary and emergency exits.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 17
NEGATIVE: Aaron, Gourley, Hargrove, New
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
AARON: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

GOURLEY: The use of butterfly doors has not been approved by the 101, *Life Safety Committee*. While the transit environment does warrant unique methods of calculating exit capacity, times, etc., the transit environment does not warrant unique exit doors. While the problems that the proposer's agency is having with standard doors, due to the piston effect of the trains, can be appreciated, other agencies have addressed this effect with engineering solutions that do not require the use of butterfly doors. The committee should not provide code relief for what apparently is a problem unique to the proposer's agency.

HARGROVE: I believe that these doors are potentially dangerous for use as emergency exits. They have not been tested, certified or accepted by any credible testing agency. Until this has been done they should be treated like a revolving door for purposes of calculating exit widths and locations.

NEW: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

(Log #32)

130-18 - (2-5.6): Accept
SUBMITTER: Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd.
RECOMMENDATION: Create a separate Section for Subsection 2-5.6 Emergency Lighting.
SUBSTANTIATION: Rather than burying this information in the Section dealing with Means of Egress, Emergency Lighting requirements should be listed in a separation section (similar to ventilation requirements).
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #33)

130-19 - (2-6): Reject
SUBMITTER: Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd.
RECOMMENDATION: Include an additional subsection in this section covering requirements for Fire Department Access with cross-referencing to the Emergency Communications Section where such communication devices are intended for Fire Department use.
SUBSTANTIATION: The Standard does not currently address requirements for Fire Department Access.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: No specific recommendation was offered; requirements that meet the intent of the Submitter will be developed through the appropriate Task Group.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #29)

130- 20 - (2-6.2): Reject
SUBMITTER: Harold A. Locke, Locke MacKinnon Domingo Gibson & Assoc. Ltd.
RECOMMENDATION: Create a separate section for requirements for Emergency Communications.
SUBSTANTIATION: Emergency Communications requirements contain information regarding passenger and central control communication devices which may be used in other than fire emergencies. Therefore, such information should not be buried under the Section Heading "Fire Protection."
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The Committee preferred the placement of the text as it exists, without change.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #15)

130- 21 - (3-2.2.2(c)): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Add to the existing text:
"For the duration of the emergency evacuation period at a minimum."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: It is essential to safe patron emergency evacuation that the 140°F not be exceeded for the duration of the emergency evacuation period. This addition to the text will ensure the appropriate atmospheric conditions are met for that duration.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 18
NEGATIVE: Bayne, Cote, Gourley
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: It is essential to safe patron emergency evacuation that the 140°F not be exceeded for the duration of the emergency evacuation period. This addition to the text will ensure the appropriate atmospheric conditions are met for that duration.
COTE: See my explanation given on Proposal #130-4.
GOURLEY: While the standard implies that safe temperatures must be maintained, the addition of this wording will reinforce the necessity of maintaining safe temperatures for the duration of the evacuation period.

(Log #CP2)

130- 22 - (3-2.4.7): Accept
SUBMITTER: Technical Committee on Fixed Guideway Transit Systems,
RECOMMENDATION: Add the word "emergency" before "lighting" so that title reads as follows:
3-2.4.7 Emergency Lighting. (See 2-5.6).
SUBSTANTIATION: To identify that Section applies to emergency lighting.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #CP4)

130- 23 - (3-3.6, 3-4.6): Accept
SUBMITTER: Technical Committee on Fixed Guideway Transit Systems,
RECOMMENDATION: In 3-3.6, Revise "safe area" to "point of safety" so that revised subsection reads as follows:
3-3.6 Egress for Passengers. The system shall incorporate means for passengers to evacuate a train at any point along the trainway and reach a point of safety. System egress points shall be illuminated.
3-4.6 Replace "wait for an evacuation train to arrive "with" other point of safety" so that revised subsection reads as follows:
3-4.6 Egress for Passengers. The transit system shall incorporate a walk surface or other suitable means for passengers to evacuate a train at any point along the trainway so that they can either proceed to the nearest station or other point of safety. System egress points shall be illuminated.
SUBSTANTIATION: For consistency in terminology.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #8)

130- 24 - (Chapter 4): Reject
SUBMITTER: John F. L. Lowndes, Mott MacDonald Group
RECOMMENDATION: Add new Chapter on Ventilation to replace sections 2-3 and 3-2.2:
Chapter X Ventilation
X-1 General.
X-1.1 Scope. This chapter covers the ventilation of stations and trainways that are below grade.
X-1.2 Purpose. There are three aims of subway ventilation namely: control of train induced draught; control of air temperature in tunnels and in stations; control of smoke in the event of fire to allow safe escape by passengers and to help fire fighters.
X-2 Draught Control.
X-2.1 The control of train induced air velocities in the public areas of stations shall ensure that passengers are subjected to air velocities not greater than 5 m/s (not more than 3 m/s at retail units, and pressure pulses shall not exceed 3 kilo Pascals, all in normal conditions.
X-2.2 Draught control shall be achieved by the provision of draught relief shafts where necessary to maintain the air velocity and pressure levels within the above limits. Shafts shall normally be located at the headwall at each end of a station. The piston effect of trains and draught relief shall contribute to the necessary air changes for the physiological requirements of passengers.
X-3 Temperature Control.
X-3.1 For passengers comfort, temperature shall be maintained below 25°C except that when the outside ambient is above 20°C the temperature shall not be greater than 5°C above ambient up to a maximum of 35°C, all in normal conditions. The controlled temperature shall apply within tunnels and on platforms.
X-3.2 Normally train induced air exchange cooling will be adequate. Additionally an under-platform extraction system may be used to draw air through the under frames of trains thus removing heat from the traction and braking equipment and drawing ambient fresh air into the system.
X-3.3 Where trains are halted in a tunnel for a prolonged period the emergency, smoke control, fans shall be used to maintain acceptable temperatures. The use of one fan only in a ventilation shaft, possibly at reduced speed and output, may be sufficient.
X-4 Smoke Control During Fire Emergency.
X-4.1 Train on Fire.
X-4.1.1 The ventilation system shall be so designed that for any location of a train a sufficient airflow can be maintained over the length of a train, in either direction, to prevent the advance of the smoke-front upstream. Typically this flow would be about 5 m/s in the annulus around a train but shall not exceed 11 m/s.
X-4.1.2 An air velocity of 5 m/s in the annulus around a train is equivalent to a velocity of approximately 2.5 m/s in the open running tunnel. 2.5 m/s would control smoke likely to be generated by a fire in the open tunnel caused by ignition of cables or other combustible materials. 5 m/s in the annulus around a train is equivalent to halting smoke propagation from a 20 MW fire (derived from Appendix B-2.4.3).
X-4.1.3 The airflow shall move the smoke in one direction from the fire to prevent backlayering, and permit the evacuation of passengers and access by fire fighters from the opposite direction in a stream of noncontaminated air not exceeding 60°C [as 2-3.2]. The choice of direction will depend on the location of the fire within the

train and shall be selected to move smoke over the minimum length of the affected train. In the event that the location of the train fire is unknown, the direction shall provide the minimum safe escape route distance for the evacuating passengers provided there is no possibility of danger from moving trains.

X-4.1.4 Ventilation fan shafts for the extraction of smoke shall be located having regard for the potential presence of a burning train and other trains on the same track. The possibility of smoke passing over a following train shall be minimized. The implications for the arrangement of signaling shall be considered. Train design shall be such that fire flash over between cars or from one train to another shall be avoided so far as practicable.

X-4.1.5 The airflows established to deal with a fire at platform level should be sufficiently stable so as not to preclude train movements on adjacent tracks or on other lines at transfer stations.

X-4.2 Fire Within the Station.

X-4.2.1 The ventilation system shall be designed to evacuate smoke while minimizing the extent of the station affected by smoke.

X-4.3 Boundaries with Adjoining Properties.

X-4.3.1 Where smoke can pass between the boundaries of adjacent properties integration of the smoke removal capabilities in both properties shall be considered. Smoke barriers shall be considered except where the boundary can be used by escaping passengers.

X-5 Platform Edge Doors.

X-5.1 The inclusion of platform edge doors provides an effective method of meeting the temperature criteria and improving the general environmental conditions at stations. A full height screen is a wall of relatively light construction built at the edge of the platform, rising to the tunnel roof to form an airtight barrier between the platform area and the trainway.

X-5.2 The wall contains doors which align with the train doors and which open and close simultaneously with the train doors. The doors are typically 0.5m wider than the train doors to allow for inaccuracy in train stopping.

X-5.3 The use of a platform screen reduces the quantity of vitiated tunnel air entering the station. The station is therefore cleaner, quieter and can be maintained at a more stable temperature.

X-5.4 The use of platform edge doors eliminates train induced draughts within the public areas of stations and avoids the need for alternative methods of reducing draught velocities.

X-5.5 The use of screens does not remove the requirement for draught relief shafts at each end of the stations. Shafts are also needed to ventilate and cool running tunnels during normal operation and to house fans for the ventilation of congested tunnels and for smoke control.

X-5.6 By preventing vitiated tunnel air from entering the station the temperature in the stations would be generally lower and the environment of the public areas more comfortable. A separate ventilation air supply shall be required for the platform areas. The duty of the ventilation supply shall be based on the physiological requirements of the standing passengers, typically 26 cubic meters per hour per person.

X-5.7 The running tunnels continue to be ventilated and cooled by the piston action of the trains and possibly by under platform extract systems at the stations. If trains are air conditioned the temperature in the running tunnels can be higher since tunnel air does not affect passengers within trains or at stations. The maximum temperature is determined by the requirements of the train air conditioning, which can be optimized to operate at the higher temperatures. However, the temperature also needs to be within acceptable limits for maintenance of the tunnels and for passenger evacuation i.e. not to exceed 60°C [as 2-3.2(c)].

X-5.8 Smoke control from a fire in a running tunnel can be more effective with platform screens. The screens confine the airflow to the trackway and the effectiveness of the tunnel ventilation fans is not diminished by having to move air through the stations as occurs in the non-partitioned station.

X-5.9 Smoke from a fire in a running tunnel would be prevented from entering the station. Passenger safety within the station would therefore be improved. Doors shall be provided at the ends of the stations to allow passengers evacuating along the running tunnels to enter the station without hindrance.

X-5.10 Screens have little effect on dealing with a train fire at a station since doors have to be maintained in the open position for evacuation and fire fighting purposes.

X-6 Fan Shafts, Louvers and Dampers.

X-6.1 Fan shafts shall normally be positioned at the ends of a station or at an intersection location to provide tunnel ventilation for temperature and smoke control.

X-6.2 Where escape stairs and tunnel ventilation are combined within a shaft there shall be a 2 hour fire separation between stairs and ventilation section.

X-6.3 The fans, acoustic treatment, louver and discharge arrangements will determine the shaft head design. Where draught relief and mechanical ventilation are combined in a shaft, the draught relief inlet/exhaust air shall by-pass the fans via dampers which shall automatically close when the fan is activated. For ease of construction, fan installation and maintenance, the fan and equipment chamber shall normally be at the top of the shaft.

X-6.4 Requirements for Surface Openings.

X-6.4.1 Shaft surface inlets/outlets shafts shall be designed to have minimum environmental impact on the surrounding area.

X-6.4.2 Where exhaust discharges onto areas used by the public, the velocity shall not exceed 2.5 meters per second. The design of surface fan buildings shall have regard to the effects of noise and the emission of vitiated air.

X-6.4.3 Shafts shall be arranged such that polluted air drawn into the subway system from road traffic is minimized.

X-7 Fans for Cooling and Emergency Ventilation.

X-7.1 Fans shall be variable speed, reversible, and shall be both locally and remotely controlled. They shall be connected to two power feeders from separate sources. Power feeders from a utility furnishing power for fans shall be isolated from each other and shall originate from separate and distinct utility sources to the extent possible. [Similar to 3-2.2.4]

X-7.2 There can be no guarantee that a single emergency fan will operate when required and it is not acceptable for fan maintenance to incapacitate the system. A fan to meet the normal cooling duty shall be available at all times. One solution is to have duplicate emergency duty fans and a separate normal duty fan. The more fans there are, the larger the fan chamber and headwalls, the greater the volume and complexity of equipment such as dampers and controls. Duplicate variable speed fans each capable of performing the emergency and cooling duties may provide the best solution. Fan output shall be regulated by speed control. Speed reduction, for the wording duty, will give a valuable reduction in noise level.

X-7.3 Ventilation fans, their motors and all related components exposed to the ventilation airflow shall be designed to operate in an ambient atmosphere of 250°C for a period of at least one hour.

X-7.4 Local fan motor starters and related operating control devices shall be located away from the direct air stream of the fans to the greatest extent practical.

X-7.5 Fans required for emergency operation shall be capable of satisfying emergency air velocity criteria in either supply or exhaust modes.

X-7.6 Discharge/outlet openings for emergency fans shall be positioned a sufficient distance from supply air intake openings to prevent recirculation. If this is not possible due to area constraints, then intake openings shall be protected by other approved means or devices to prevent smoke from reentering the system.

X-7.7 Operation and fail-safe verification of proper operation of emergency fans shall be effected from a central supervising station with indication provided for all modes of operation for each fan, as well as from a local control isolated as in X-7.4.

X-7.8 Thermal overload protective devices shall not be located on motor controls of fans used for emergency ventilation.

X-7.9 Local controls shall permit overriding remote central supervising control. Local control shall be capable of operating the fans in all modes in the event the remote controls become inoperable.

X-7.10 Smoke is the major hazard for passengers in a fire emergency and it follows that the regime to supervise and control fans must be effective and reliable. The possibility of human error during an emergency shall be kept to a minimum.

SUBSTANTIATION: Control of smoke is essential to provide safety for passengers evacuating to a safe refuge or to the surface of a subway. Smoke producing fires can be caused by ignition of detritus, luggage, construction materials, electrical components and especially by train fires where the fire load may exceed 20 MW. A separate chapter on ventilation is now justified because of the acceptance of its importance for smoke control in subways, the development of computerized aerodynamic programs that determine ventilation design features and simulate incidents. Improved communications and computerized train and ventilation controls enable a safe and rapid response to be made such that smoke can be controlled by ventilation within two minutes of an incident report to the central supervising station. This is well illustrated by the presentation on emergency ventilation given to the 1991 Rapid Transit Conference of the APTA by the Montreal Subway Authority.

Subway ventilation embraces control of train induced draught, control of air temperature in tunnels and stations, and directional control of smoke to give safe evacuation. These three facets of ventilation are intercalated, for example a draught shaft may also contain a fan that can be used both for tunnel cooling and for smoke control. The ventilation chapter should therefore be comprehensive with emphases on smoke control during fire emergencies.

The chapter contains proposals based on knowledge of subways in North America and elsewhere and smoke behavior proven by accepted work on computational fluid dynamics. Therefore the

committee may consider that a supporting statement for each clause of the chapter is not necessary but we would welcome the opportunity to discuss any points with the committee as to respond to any queries in writing. Any items in the proposed chapter that are repeated from the existing edition are acknowledged.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: Committee Action was to temporarily reject this recommendation because of insufficient time in this revision cycle to address and fully define the ventilation issues in standard format. The importance of the new ventilation chapter is recognized by the committee and a Ventilation Task Group has been appointed by the Chair and the Committee will request to enter a two year revision cycle following this (Annual 1995) revision cycle.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #25)

130- 25 - (4-2.5): Reject
SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC
RECOMMENDATION: Add to existing paragraph:
"Equipment which may be the source of ignition due to overheating/malfunction shall be fitted with sensors to automatically remove power to that component when dangerously elevated temperatures are reached."
SUBSTANTIATION: Continued electrical input can cause a threatening situation to develop into a fire emergency. Present technology can achieve shut down before an emergency condition develops and should be implemented to provide maximum patron safety.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: Continued electrical input can cause a threatening situation to develop into a fire emergency. Present technology can achieve shut down before an emergency condition develops and should be implemented to provide maximum patron safety.
COTE: See my explanation given on Proposal #130-4.

(Log #CP3)

130- 26 - (5-2.2): Accept
SUBMITTER: Technical Committee on Fixed Guideway Transit Systems
RECOMMENDATION: Change the title of this subsection from "Accessibility" to "Emergency Access."
SUBSTANTIATION: To better describe the subsection and to be consistent with the language in Chapter 3..
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 21
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

---

(Log #26)

130- 27 - (A-2-5.3.4.3 (New)): Accept in Principle
SUBMITTER: Ghislain M. Côté, Société de transport de la Communauté urbaine de Montréal
RECOMMENDATION: Add new text as follows:
"Butterfly doors specifically designed for underground transit systems shall be acceptable as emergency exits in conjunction with specific ventilation scenarios. The butterfly door consists of single two door panel that pivots vertically on a central axis. When closed the door is set at an angle in a deep frame thus clearly indicating the exit direction."
SUBSTANTIATION: The butterfly door was developed to remedy the problems caused by significant variations in air pressure encountered in ventilation scenarios. The purpose of the vertical axis is to equalize air pressure on both sides of the door, thus eliminating all resistance.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE STATEMENT: See Committee Action on 130-1 (Log #3).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 17
NEGATIVE: Aaron, Gourley, Hargrove, New
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
AARON: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.
Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.
GOURLEY: The use of butterfly doors has not been approved by the 101, *Life Safety Committee*. While the transit environment does warrant unique methods of calculating exit capacity, times, etc., the transit environment does not warrant unique exit doors. While the problems that the proposer's agency is having with standard doors, due to the piston effect of the trains, can be appreciated, other agencies have addressed this effect with engineering solutions that do not require the use of butterfly doors. The committee should not provide code relief for what apparently is a problem unique to the proposer's agency.
HARGROVE: I believe that these doors are potentially dangerous for use as emergency exits.
They have not been tested, certified or accepted by any credible testing agency. Until this has been done they should be treated like a revolving door for purposes of calculating exit widths and locations.
NEW: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.
Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

(Log #16)

130- 28 - (B-1.1): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, WA Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Revise to read:
"The tolerance limits pertaining to air quality, temperatures and velocities vary with age, health, weight, sex and acclimatization. Most of the studies on human tolerance to adverse situations have dealt with exposure tests on healthy acclimated adults which comprise the major of population. These individuals can survive in environments potentially harmful to the less physically fit. It must be assumed, however, that under emergency conditions in subways, some of the passengers might be infants, aged, or suffering from respiratory or cardiac ailments. The tolerances and safety of these passengers must be considered."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not recognize advances in technology dealing with identification and managing tolerance variations nor the requirements of the American with Disabilities Act. The revision better acknowledges and responds to both.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The tolerance limits pertaining to air quality temperatures and velocities vary with age, health, weight, sex and acclimatization. Most of the studies on human resistance to adverse situations have dealt with exposure tests on healthy acclimated adults which comprise the major of population. These individuals can survive in environments potentially harmful to the less physically fit. It must be assumed, however, that under emergency conditions in subways, some of the passengers might be infants, aged or suffering from respiratory or cardiac ailments. The tolerances and safety of these passengers must be considered.
COTE: See my explanation given on Proposal #130-4.

(Log #17)

130- 29 - (B-2.1.2): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, Washington Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Revise to read:
"The contaminants, level of concentration and toxic emission time in the station atmosphere will vary between properties. By analysis of the materials comprising the combustible load and the geometries, the environmental air control engineer will know how long a life sustaining environment must be maintained. Emergency ventilation systems must be designed to exhaust to redirect the contaminated air away from evacuees and maintain a life sustaining environment for the duration of the emergency evacuation period."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not recognize the variations between properties and advances in technology made since first published in 1983. The 4 and 6 minutes currently in the standard are estimated times and do not ensure a life sustaining environment is maintained in all cases. Research and computer simulations can now relate the combustible loads and geometries, the required atmospheric conditions and define the movement/direction of the contaminants under specific ventilation designs. Utilizing advanced technology provides site specific evaluation not currently achieved by estimated times (4 and 6 minutes) universally applied.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not recognize the variations between properties and advances in technology made since first published in 1983. The 4 and 6 minutes currently in the standard are estimated times and do not ensure a life sustaining environment is maintained in all cases. Research and computer simulations can now relate the combustible loads and geometrics, the required atmospheric conditions are defined as movement/ direct of the contaminants under specific variation designs. Utilizing advances technology provides site specific evaluation not current achieved by estimated times (4 and 6 minutes) universally applied.
COTE: See my explanation given on Proposal #130-4.

(Log #9)

130- 30 - (B-2.4.1): Reject
SUBMITTER: John F. L. Lowndes, Mott MacDonald Group
RECOMMENDATION: Delete the words:
"A consensus on definitive design guidelines for subway emergencies is unavailable because of the present level of the state of the art."
SUBSTANTIATION: Aerodynamic programs have been developed which provide proven data for ventilation control of smoke and for the cooling of subways.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-24 (Log #8).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not recognize the advances in technology since first published in 1983. Advanced technology now exists to analyze systems specifically. This revision brings the standard into conformance with current technological capabilities and provides consistency with other proposals dealing with ventilation.
COTE: See my explanation given on Proposal #130-4.

(Log #18)

130- 31 - (B-2.4.1): Reject
SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC
RECOMMENDATION: Delete the sentence:
"A consensus on definitive design guidelines for subway emergencies is unavailable because of the present level of the State of the Art."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not recognize the advances in technology since first published in 1983. Advanced technology now exists to analyze systems specifically. This revision brings the standard into conformance with current technological capabilities and provides consistency with other proposals dealing with ventilation.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not recognize the advances in technology since first published in 1983. Advanced technology now exists to analyze systems specifically. This revision brings the standard into conformance with current technological capabilities and provides consistency with other proposals dealing with ventilation.
COTE: See my explanation given on Proposal #130-4.

(Log #19)

130- 32 - (B-2.4.3): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, Washington Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Revise text as follows:
1. Revise first paragraph to read:
"The design of the emergency ventilation system to provide a life sustaining environment and minimize the hazard of smoke backlayering in an evacuation pathway should be based on the fire load and the site geometries."
2. Fourth paragraph, delete:
"Available test data on combustibility of materials utilized in transit vehicles is either incomplete or not directly applicable to the situation of a train fire in an underground confined trainway."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: The standard as currently written does not recognize the advances in technology since published in 1983. This revision brings the standard into conformance with current technological capabilities and provides consistency with other proposals dealing with ventilation.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: The standard as currently written does not recognize the advances in technology since published in 1983. This revision brings the standard into conformance with current technological capabilities and provides consistency with other proposals dealing with ventilation.
COTE: See my explanation given on Proposal #130-4.

(Log #20)

130- 33 - (B-2.5.3): Reject
SUBMITTER: Melba Bayne/Ghislain M. Côté, Washington Metro. Area Transit Authority, DC/STCUM
RECOMMENDATION: Replace existing text as follows:
"The ventilation system design for maintaining a life sustaining environment for the duration of the emergency evacuation period is

a function of (1) the combustible load, (2) the smoke/fire development rate, (3) site geometries, and (4) the patron movement speeds through the system components."

[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]

SUBSTANTIATION: The standard as currently written places the emphasis incorrectly. The ventilation system should be designed, considering the 4 variables identified above, and with patron travel lanes designed for efficient patron movement under normal operating conditions-not additional exit lanes added to achieve evacuation in an unsubstantiated time frame by arbitrarily sized fans.

COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 19

NEGATIVE: Bayne, Cote

NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

EXPLANATION OF NEGATIVE:

BAYNE: The standard as currently written places the emphasis incorrectly. The ventilation system should be designed, considering the 4 variables identified above, and with patron travel lanes designated for efficient patron movement under normal operating conditions not additional exit lanes added to achieve evacuation in an unsubstantiated time frame by arbitrarily sized fans.

COTE: See my explanation given on Proposal #130-4.

(Log #4)

130- 34 - (Appendix C): Accept in Principle

SUBMITTER: Ghislain M. Cote, *Société de transport de la* Communauté urbaine de Montréal

RECOMMENDATION: Revise text:

"Butterfly doors specially designed for underground transit systems shall be acceptable as emergency exits in conjunction with specific ventilation scenarios. The butterfly door consists of single two door panel that pivots vertically on a central axis. When closed, the door is set at an angle in a deep frame thus clearly indicating the exit direction."

SUBSTANTIATION: The butterfly door was developed to remedy the problems caused by significant variations in air pressure encountered in ventilation scenarios. The purpose of the vertical axis is to equalize air pressure on both sides of the door, thus eliminating all resistance.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE STATEMENT: See Committee Action on 130-1 (Log #3).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 17

NEGATIVE: Aaron, Gourley, Hargrove, New

NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

EXPLANATION OF NEGATIVE:

AARON: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

GOURLEY: The use of butterfly doors has not been approved by the 101, *Life Safety Committee*. While the transit environment does warrant unique methods of calculating exit capacity, times, etc., the transit environment does not warrant unique exit doors. While the problems that the proposer's agency is having with standard doors, due to the piston effect of the trains, can be appreciated, other agencies have addressed this effect with engineering solutions that do not require the use of butterfly doors. The committee should not provide code relief for what apparently is a problem unique to the proposer's agency.

HARGROVE: I believe that these doors are potentially dangerous for use as emergency exits.

They have not been tested, certified or accepted by any credible testing agency. Until this has been done, they should be treated like a revolving door for purposes of calculating exit widths and locations.

NEW: Acceptance of these doors in the Standard is contrary to NFPA 101, *Life Safety Code*. These doors have not been adequately tested, listed by an Approved agency, or proven to be acceptable for use as an exit.

Due to the nature of the Montreal system, they find it necessary to use these types of doors. To allow for the rest of the world is not prudent until they have a proven track record.

(Log #21)

130- 35 - (C-1.2): Reject

SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC

RECOMMENDATION: Combine paragraphs 6 and 7 to read:

"In Test #1, the time to clear the platform is found to be 3.469 minutes. In Test #2 the time to evacuate the enclosing structures is 4.289 minutes. At a minimum the ventilation system must be designed to provide a life sustaining environment for the entire occupant load to evacuate the enclosing structure or reach a point of safety (EXCLUDING the AORA)."

[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]

SUBSTANTIATION: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 19

NEGATIVE: Bayne, Cote

NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

EXPLANATION OF NEGATIVE:

BAYNE: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COTE: See my explanation given on Proposal #130-4.

(Log #22)

130- 36 - (Table C-1.2): Reject

SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC

RECOMMENDATION: 1. Revise Text #1 - first two lines to read:

"Example Platform Occupant Load Evacuation Calculations."

2. Revise Test #2 - first two lines to read:

"Example Station Occupant Load Evacuation Calculations."

[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]

SUBSTANTIATION: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 19

NEGATIVE: Bayne, Cote

NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman

EXPLANATION OF NEGATIVE:

BAYNE: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COTE: See my explanation given on Proposal #130-4.

(Log #24)

130- 37 - (C-1.3): Reject

SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC

RECOMMENDATION: Revise text as follows:

1. Delete the third sentence in paragraph 7.
2. Delete paragraph 8 in its entirety.
3. Revise paragraph 9 to read:

"Additional calculations must also be made to examine the results of discounting an escalator between the platform and concourse."

[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]

SUBSTANTIATION: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: This revision is required to bring the appendix into conformance with changes in the body of the standard.
COTE: See my explanation given on Proposal #130-4.

(Log #23)

130- 38 - (Table C-1.3): Reject
SUBMITTER: Melba Bayne, Washington Metro. Area Transit Authority, DC
RECOMMENDATION: 1. Revise Text #1 - first two lines to read:
"Example Platform Occupant Load Evacuation Calculations."
2. Revise Test #2 - first two lines to read:
"Example Station Occupant Load Evacuation Times."
[This proposal is one of 16 related proposed changes in sections 1-5, 2-3.2(c), 2-5.3.3, 2-5.3.4.2, 3-2.2.2(c), B-1.1, B-2.1.2, B-2.4.1, B-2.5.3, C-1.2, and C-1.3.]
SUBSTANTIATION: This revision is required to bring the appendix into conformance with changes in the body of the standard.

COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Statement on 130-12 (Log #12).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 28
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 19
NEGATIVE: Bayne, Cote
NOT RETURNED: Anson, Gallo, Hathaway, Locke, MacMonagle, O'Dowd, Zicherman
EXPLANATION OF NEGATIVE:
BAYNE: This revision is required to bring the appendix into conformance with changes in the body of the standard.
COTE: See my explanation given on Proposal #130-4.
