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WEB-i®
Joists

Dec. 08, 2014

Subject: Wind Loads & ASCE 7-10

Web Joist NW Corp. uses ASCE 7-10, Sect. 2.4 for Allowable Stress Design (ASD) of Load Combinations for Web Joist Trusses or WEB-i I-Joists.

The wind loads from ASCE 7-10 are based on ultimate wind loads.
In ASCE 7-10, Sect. 2.3 for LRFD, the wind factor is 1.0 ($1.0W_{Ult.}$).
In ASCE 7-10, Sect. 2.4 for ASD, the wind factor is 0.6 ($0.6W_{Ult.}$).

There are two types of wind loading, MWFRS (Main Wind Force Resisting System) and C&C (Components & Cladding). The wind loads from MWFRS are used for connections (or Reactions) of Web Joist Trusses or WEB-i I-Joists under various load combinations. The wind loads from C&C are used for design of Web Joist Trusses or WEB-i I-Joists under various load combinations.

When a wind load is acting down, it is a positive sign (+20 psf).
When a wind load is acting up, it is a negative sign (-20 psf).
Dead load is always acting down, it is a positive sign (+15 psf).

Gross wind – Same as $W_{Ult.}$. This value has not been adjusted for any Dead load.
Net wind (-) – A negative value resulting from a Load Combination that has more Wind uplift (-) than the downward (+) Dead load. Example: W = -25 psf & D = +15 psf
Eq. 5 = D+0.6W = 15+(-15) = 0 psf Eq. 7 = 0.6D+0.6W = 9+(-15) = -6 Net psf
Note: Net wind is always a negative (-) value.

Sincerely Yours,
Web Joist NW Corp.

Bruce Howard – Tech. Rep.

Load Combinations

Changes from 2009 IBC to 2012 IBC
Changes from ASCE 7-05 to ASCE 7-10

IBC 2009 Sect. 1605.3 - Allowable Stress Design (ASD)		
D + F	C_D = 0.90	Eq. 16-8
D + H + F + L + T	C_D = 1.00	Eq. 16-9
D + H + F + (L_r or S or R)	C_D = 1.25 or 1.15	Eq. 16-10
D + H + F + 0.75(L+T) + 0.75(L_r or S or R)	C_D = 1.25 or 1.15	Eq. 16-11
D + H + F + (W or 0.7E) [W or E Down (+)]	C_D = 1.60	Eq. 16-12
D + H + F + 0.75(W or 0.7E) + 0.75L + 0.75(L_r or S or R)	C_D = 1.60	Eq. 16-13
0.6D + W + H [W up (-)]	C_D = 1.60	Eq. 16-14
0.6D + 0.7E + H [E up (-)]	C_D = 1.60	Eq. 16-15

When IBC 2009 refers to ASCE 7 it is ASCE 7-05 (Pub. 2005)

ASCE 7-05 Sect. 2.4 - Allowable Stress Design (ASD)		
D + F	C_D = 0.90	Eq. 1
D + H + F + L + T	C_D = 1.00	Eq. 2
D + H + F + (L_r or S or R)	C_D = 1.25 or 1.15	Eq. 3
D + H + F + 0.75(L+T) + 0.75(L_r or S or R)	C_D = 1.25 or 1.15	Eq. 4
D + H + F + (W or 0.7E) [W or E Down (+)]	C_D = 1.60	Eq. 5
D + H + F + 0.75(W or 0.7E) + 0.75L + 0.75(L_r or S or R)	C_D = 1.60	Eq. 6
0.6D + W + H [W up (-)]	C_D = 1.60	Eq. 7
0.6D + 0.7E + H [E up (-)]	C_D = 1.60	Eq. 8

Notations:

D = Dead load
E = Earthquake load
F = Fluids
H = Lareral earth pressure
L = Live load
L_r = Roof live load
R = Rain
S = Snow load
$W_{Ult.}$ = Wind load (Ult.)
W = Wind Load (ASD)

IBC 2012 Sect. 1605.3 - Allowable Stress Design (ASD)		
D + F	C_D = 0.90	Eq. 16-8
D + H + F + L	C_D = 1.00	Eq. 16-9
D + H + F + (L_r or S or R)	C_D = 1.25 or 1.15	Eq. 16-10
D + H + F + 0.75(L) + 0.75(L_r or S or R)	C_D = 1.25 or 1.15	Eq. 16-11
D + H + F + (0.6$W_{Ult.}$ or 0.7E) [W or E Dn (+)]	C_D = 1.60	Eq. 16-12
D + H + F + 0.75(0.6$W_{Ult.}$) + 0.75L + 0.75(L_r or S or R)	C_D = 1.60	Eq. 16-13
D + H + F + 0.75(0.7E) + 0.75L + 0.75S	C_D = 1.60	Eq. 16-14
0.6D + 0.6$W_{Ult.}$ + H [W up (-)]	C_D = 1.60	Eq. 16-15
0.6(D + F) + 0.7E + H [E up (-)]	C_D = 1.60	Eq. 16-16

When IBC 2012 refers to ASCE 7 it is ASCE 7-10 (Pub. 2010)

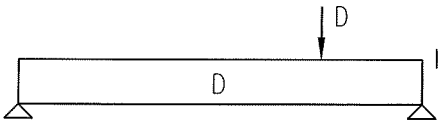
ASCE 7-10 Sect. 2.4 - Allowable Stress Design (ASD)		
D	C_D = 0.90	Eq. 1
D + L	C_D = 1.00	Eq. 2
D + (L_r or S or R)	C_D = 1.25 or 1.15	Eq. 3
D + 0.75L + 0.75(L_r or S or R)	C_D = 1.25 or 1.15	Eq. 4
D + (0.6$W_{Ult.}$ or 0.7E) [W or E Down (+)]	C_D = 1.60	Eq. 5
D + 0.75L + 0.75(0.6$W_{Ult.}$) + 0.75(L_r or S or R)	C_D = 1.60	Eq. 6a
D + 0.75L + 0.75(0.7E) + 0.75S	C_D = 1.60	Eq. 6b
0.6D + 0.6$W_{Ult.}$ [W up (-)]	C_D = 1.60	Eq. 7
0.6D + 0.7E [E up (-)]	C_D = 1.60	Eq. 8

ASCE 7-10 & IBC 2012 are based on ultimate (Ult.) wind speed maps. Therefore, Wind pressures (W) are Ultimate.

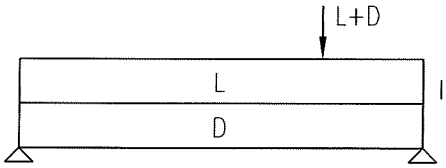
Exceptions: See text of ASCE 7-10 Sect. 2.4 or see text of IBC 2012 Sect. 1605.3 for exceptions.

Load Combinations

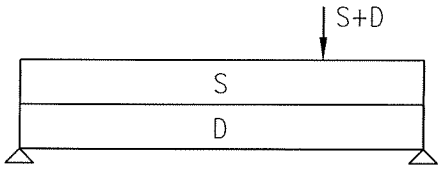
Allowable Stress Design (ASD)
ASCE 7-05 (2.4) / IBC 2009 (1605.3)



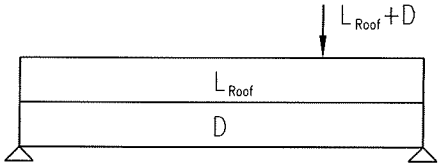
ASCE Eq. 1
IBC Eq. 16-8
C_D = 0.90



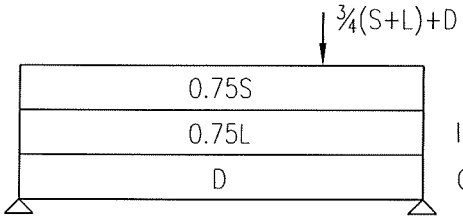
ASCE Eq. 2
IBC Eq. 16-9
C_D = 1.00



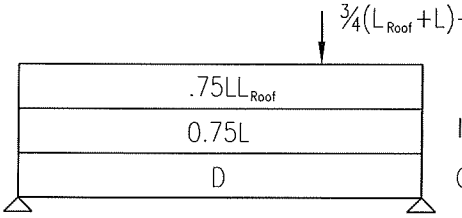
ASCE Eq. 3
IBC Eq. 16-10
C_D = 1.15



ASCE Eq. 3
IBC Eq. 16-10
C_D = 1.25

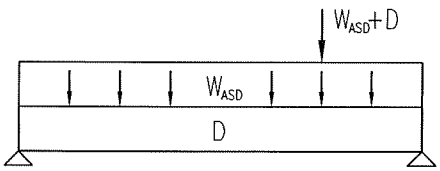


ASCE Eq. 4
IBC Eq. 16-11
C_D = 1.15



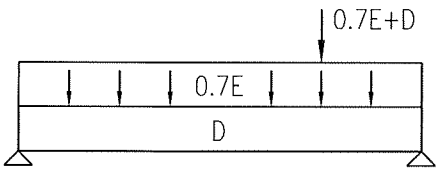
ASCE Eq. 4
IBC Eq. 16-11
C_D = 1.25

Wind Down (+)



ASCE Eq. 5
IBC Eq. 16-12
C_D = 1.60

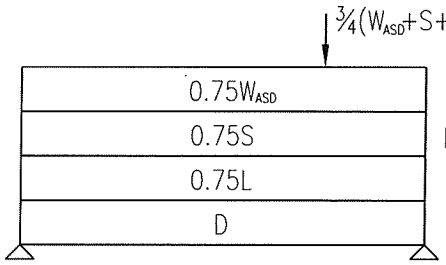
Seismic Down (+)



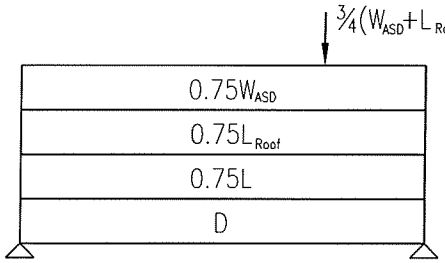
ASCE Eq. 5
IBC Eq. 16-12
C_D = 1.60

Exceptions:
See text of ASCE 7-05 Sect. 2.4 or see text of IBC 2009 Sect. 1605.3 for exceptions.

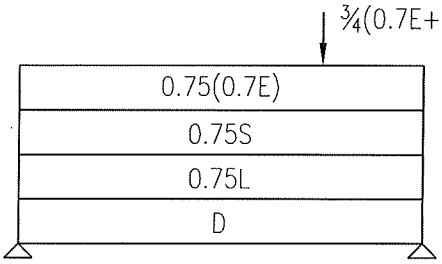
Note: W or E loads may act up (-) or down(+).



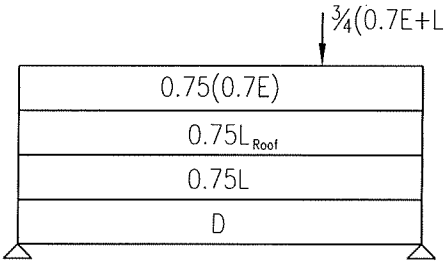
ASCE Eq. 6
IBC Eq. 16-13
C_D = 1.60



ASCE Eq. 6
IBC Eq. 16-13
C_D = 1.60

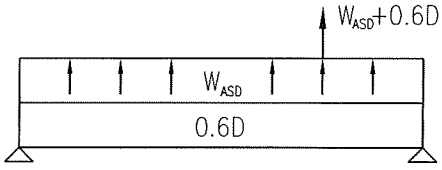


ASCE Eq. 6
IBC Eq. 16-13
C_D = 1.60



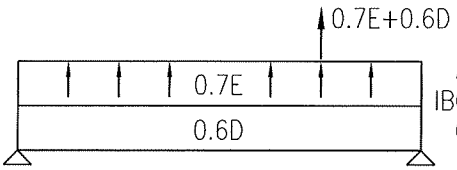
ASCE Eq. 6
IBC Eq. 16-13
C_D = 1.60

Wind Up (-)



ASCE Eq. 7
IBC Eq. 16-14
C_D = 1.60

Seismic Up (-)



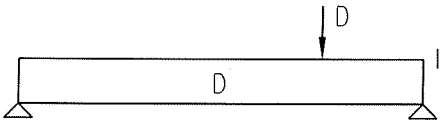
ASCE Eq. 8
IBC Eq. 16-15
C_D = 1.60

Notations:
D = Dead Load
E = Earthquake (Seismic)
F = Fluids
H = Lateral earth pressure
L = Any Live Load expect roof
L_{Roof} = Live Load Roof
R = Rain
S = Snow Load
W_{ASD} = Wind Load

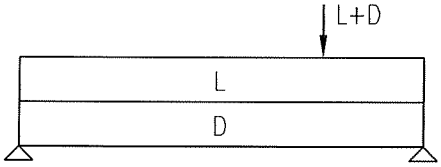
BEH 12-01-14

Load Combinations

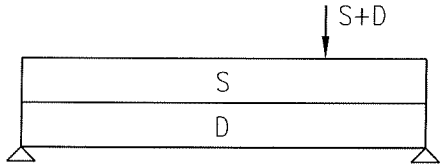
Allowable Stress Design (ASD)
ASCE 7-10 (2.4) / IBC 2012 (1605.3)



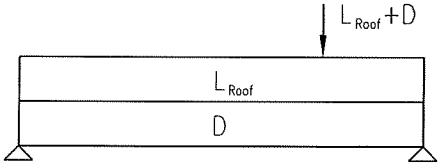
ASCE Eq. 1
IBC Eq. 16-8
C_D = 0.90



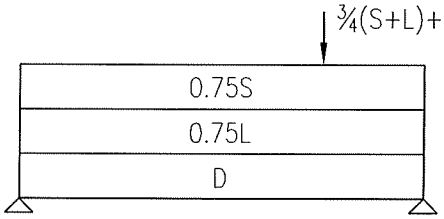
ASCE Eq. 2
IBC Eq. 16-9
C_D = 1.00



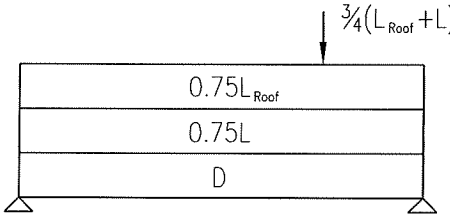
ASCE Eq. 3
IBC Eq. 16-10
C_D = 1.15



ASCE Eq. 3
IBC Eq. 16-10
C_D = 1.25

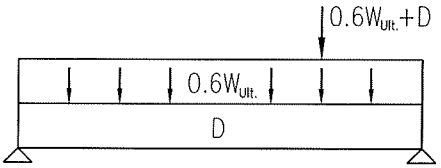


ASCE Eq. 4
IBC Eq. 16-11
C_D = 1.15



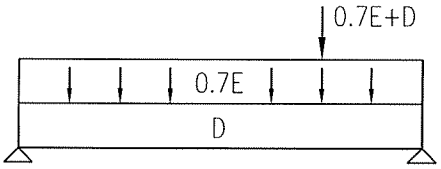
ASCE Eq. 4
IBC Eq. 16-11
C_D = 1.25

Wind Down (+)



ASCE Eq. 5
IBC Eq. 16-12
C_D = 1.60

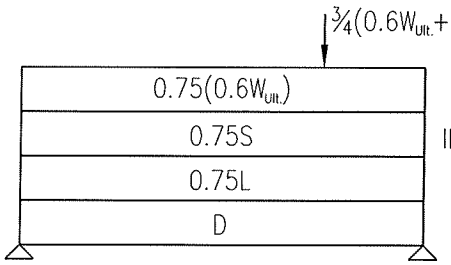
Seismic Down (+)



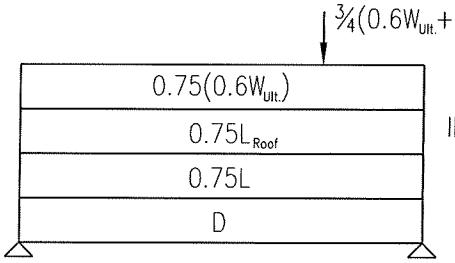
ASCE Eq. 5
IBC Eq. 16-12
C_D = 1.60

Exceptions:
See text of ASCE 7-10 Sect. 2.4 or see text of IBC 2012 Sect. 1605.3 for exceptions.

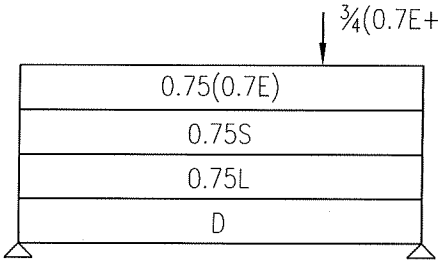
Note: W or E loads may act up (-) or down(+).



ASCE Eq. 6a
IBC Eq. 16-13
C_D = 1.60

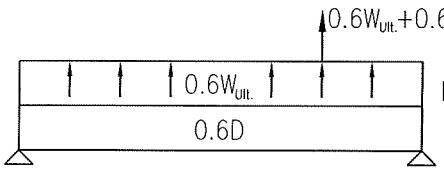


ASCE Eq. 6a
IBC Eq. 16-13
C_D = 1.60



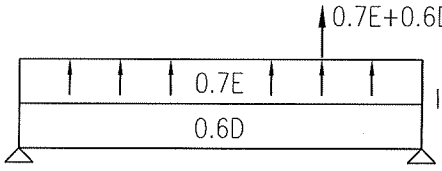
ASCE Eq. 6b
IBC Eq. 16-14
C_D = 1.60

Wind Up (-)



ASCE Eq. 7
IBC Eq. 16-15
C_D = 1.60

Seismic Up (-)



ASCE Eq. 8
IBC Eq. 16-16
C_D = 1.60

Notations:
D = Dead Load
E = Earthquake (Seismic)
F = Fluids
H = Lateral earth pressure
L = Any Live Load expect roof
L_{Roof} = Live Load Roof
R = Rain
S = Snow Load
$W_{Ult.}$ = Wind Load

ASCE 7-10 & IBC 2012 are based on ultimate (Ult.) wind speed maps. Therefore, wind pressures (W) are ultimate.

BEH 12-01-14