

# SHOCK, IMPACT, & PENETRATION TESTING



Industrial hard hats are subjected to many types of testing to provide the best protection possible. Learn about shock and impact testing requirements for ANSI and EN.



**TYPE I**

**ANSI Z89.1-2014 R2019**



**TYPE II**

**ANSI Z89.1-2014 R2019**



**EN12492**

**EN 12492:2012**

# ANSI Z89.1-2014 R2019



Shock & Impact



Penetration



Test Zone



## TYPE I

**Test:**  
Force Transmission

**Equivalent:**  
Hammer falling from  
over 21 ft. (6.4 m)

**Impact Force:**  
54.5 Joules (40.2 ft.-lb.)

**Pass Criteria:**  
Transmitted force  
< 4450 N (1000 lb.)  
Sample average  
< 3780 N (850 lb.)

**Test:**  
Impact Energy  
Attenuation

**Equivalent:**  
Hammer falling from  
nearly 12 ft. (3.7 m)

**Impact Force:**  
30.6 Joules (22.6 ft.-lb.)

**Pass Criteria:**  
Maximum  
acceleration  $\leq 150 g^*$

# ANSI Z89.1-2014 R2019

3.6 m/s



Shock & Impact

5.0 m/s

1.0 kg



Penetration



Test Zone



## TYPE II

**Test:**  
Apex Penetration

**Equivalent:**  
Hammer falling from  
over 10 ft. (3.0 m)

**Impact Force:**  
24.5 Joules (18.1 ft.-lb.)

**Pass Criteria:**  
Penetrator shall not  
make contact with  
top of test headform.

**Test:**  
Off-Center  
Penetration

**Equivalent:**  
Hammer falling from  
nearly 4.9 ft. (1.5 m)

**Impact Force:**  
12.5 Joules (9.2 ft.-lb.)

**Pass Criteria:**  
Penetrator shall not  
make contact with  
top of test headform.

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## MOUNTAINEERING



2 m drop  
5.0 kg



0.5 m drop

5.0 kg



### Shock & Impact

1 m drop  
3.0 kg



Penetration



Test Zone

## SHOCK & IMPACT

### Test:

Shock Absorption

### Impact Force:

A: 98.1 Joules (72.35 ft.-lb.)

B: 24.0 Joules (17.70 ft.-lb.)

### Pass Criteria:

Transmitted force  $\leq$  10000 N (2250 lb.)

## PENETRATION

### Test:

Penetration

### Impact Force:

29.4 Joules (21.7 ft.-lb.)

### Pass Criteria:

Point of striker does not contact headform