

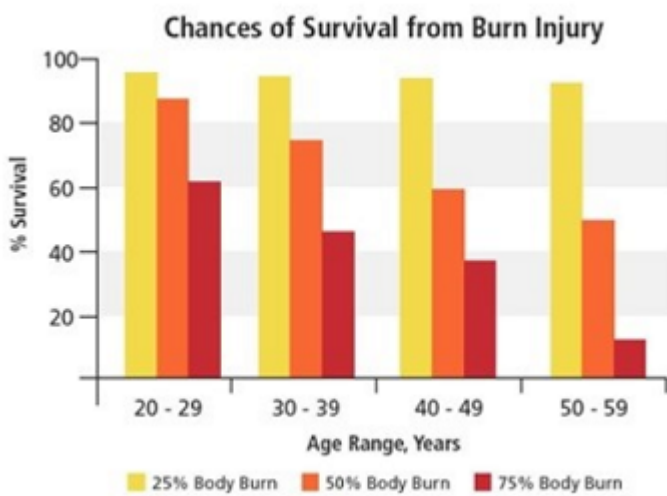
Personal Protective Equipment

Flash Fires

Brought To You by MCR Safety | Mar 31, 2020

Why is Body Burn Percentage So Important?

The *American Burn Association* reports the primary causes of burn injuries as fire-flame, scalds, contact with a hot object, and electrical and chemical burns. The graph below shows the chances of survival from burn injuries at different percentages of body burn.



*Graph based on information from the American Burn Association, National Burn Repository 2010 report

At 25% or less, chances of survival from a burn injury are very good, with survival rates at nearly 90%. Once the body burn percentage exceeds 50%, however, survival rates drop precipitously, especially for older individuals. Workers in their 50s, with burns over more than half their body, have less than a 20% chance of surviving. Clearly, the best way to survive a job-site fire is to protect as much of the body as possible. Here is an even more detailed table showing the percentage of mortality rates within different age groups and burn size.

Mortality Rate by Age Group And Burn Size
(expressed as the number of deaths over the total number of patients in that group)

Age Group	Burn Size (% TBSA)										Total
	0.1-9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	>=90	
birth -1.9	0.0%	0.3%	2.1%	3.6%	12.9%	20.9%	41.4%	57.1%	66.7%	66.7%	1.2%
<i>Pct row</i>	2/4282	4/1450	7/327	5/139	11/85	9/43	12/29	12/21	8/12	6/9	76/6397
2 - 4.9	0.3%	0.4%	3.8%	5.5%	5.1%	10.9%	30.8%	28.1%	65.0%	78.3%	2.3%
<i>Pct row</i>	7/2225	3/784	11/293	7/128	4/78	6/55	8/26	9/32	13/20	18/23	86/3664
5 - 19.9	0.2%	0.2%	1.4%	2.7%	8.7%	9.9%	17.7%	37.3%	40.4%	63.9%	2.0%
<i>Pct row</i>	9/4792	4/1737	10/690	9/331	18/208	14/142	17/96	22/59	23/57	39/61	165/8173
20-29.9	0.3%	0.6%	2.7%	3.5%	9.0%	14.5%	32.4%	37.0%	60.0%	84.6%	2.8%
<i>Pct row</i>	10/3823	9/1445	15/558	9/257	16/177	17/117	23/71	17/46	27/45	44/52	187/6591
30-30.9	0.1%	0.6%	3.6%	6.9%	15.1%	28.5%	39.8%	51.4%	66.7%	75.9%	3.6%
<i>Pct row</i>	6/4334	10/1647	22/616	25/361	25/166	39/137	33/83	37/72	32/48	41/54	270/7518
40-40.9	0.5%	1.3%	5.0%	17.3%	25.7%	32.4%	43.8%	58.5%	79.1%	85.2%	5.6%
<i>Pct row</i>	17/3331	15/1186	26/520	43/248	46/179	33/102	35/80	31/53	34/43	46/54	326/5796
50-50.9	1.3%	3.6%	10.8%	23.0%	41.3%	51.9%	62.2%	87.5%	78.3%	82.6%	9.1%
<i>Pct row</i>	26/1967	26/730	35/325	41/178	43/104	42/81	23/37	28/32	18/23	38/46	320/3523
60-60.9	2.1%	8.8%	17.1%	39.4%	63.0%	74.5%	75.7%	92.6%	87.0%	80.0%	15.4%
<i>Pct row</i>	23/1099	43/486	42/245	41/104	46/73	41/55	28/37	25/27	20/23	28/35	337/2184
>=70	7.3%	26.5%	53.3%	72.7%	79.8%	90.1%	95.5%	89.1%	91.7%	91.4%	31.3%
<i>Pct row</i>	102/1403	195/735	162/304	149/205	87/109	91/101	63/66	49/55	22/24	32/35	952/3037
Total	0.7%	3.0%	8.5%	16.9%	25.1%	35.1%	46.1%	57.9%	66.8%	79.1%	5.8%
<i>Pct row</i>	202/27256	309/10200	330/3878	329/1951	296/1179	292/833	242/525	230/397	197/295	292/369	2719/46883

Standards that guide FR clothing are based around performance at 50%, as that is when survival rates begin to drastically drop. The most recognized test method for establishing burn rates on garments utilizes standard ASTM F1930, performed on a manikin test subject. The method tests a garment at three seconds with a pass/fail rate of 50% total body burn.

Here are some of the key takeaways from the American Burn Institute's 2017 National Burn Repository:

- For survivors, the average length of the hospital stay was slightly greater than 1 day per % total body surface area (TBSA) burned.
- For those who died, the total hospital stay was typically between 2-3 weeks in patients with %TBSA < 80%.
- Generally, 87% of patients were discharged home and 3% were transferred to rehabilitation facilities.
- Overall, the charges for patients who died were over three times greater than those who survived; however, this was greatly affected by a large number of patients with burns < 10% TBSA. For burns >10% TBSA, total charges for surviving patients averaged \$269,523 and charges for non-survivors averaged \$361,342.

What MCR Safety hopes you take away from the information above is that each percentage point jump in TBSA% results in greater recovery time for workers and a greater overall cost to the company. In addition to burn injuries, the repository notes that death rates from burn injuries increase with a worker's age, burn size, and the presence of heat inhalation injury. The 2012 National Burn Repository provides data that proves inhalation injury increases the mortality rate by 16 times. In another journal source from the *NCBI*, data shows that the overall mortality rate among patients with inhalation injury was 41.5%, compared with 7.2% among patients without inhalation injury. These figures indicate that inhalation injury is a leading cause of death when workers are exposed to fires. Approximately 80% of fire-related deaths are due to the inhalation of toxic products, especially carbon monoxide and

hydrogen cyanide gases.

This is where MCR Safety enters the picture.

Burn Rates and Summit Breeze® Technology

Is it possible to achieve FR compliance and only meet the minimum standard? The answer is absolutely and unfortunately: Yes. NFPA 2112 does not differentiate performance from 0% body burn to 50% body burn. No such labeling is required. Keeping the body burn rate lower than 50% is the minimum requirement to meet the guidelines set by NFPA 2112, which means that many times that number becomes the focal point for garment manufacturers.

However, not all NFPA 2112 products perform to the same level. Some companies may only strive to offer products that meet minimum specifications. At MCR Safety, we've never done business that way. Whether it's a cut-resistant glove achieving A9 performance or FRC achieving low burn rates, we go above and beyond the minimum specifications. In the table below, MCR Safety highlights their Summit Breeze® technology's burn rate performance compared to other material utilized in FR garments.

When you're dealing with flash fires that often last only a few seconds, the initial protection offered goes a long way. With the addition of Summit Breeze® technology, workers have the best flash fire performance offered.

Confirmed Fabric / Material	Weight	Burn Rate
MCR Safety FR Gear, 88% Cotton / 12% Nylon	6.5 oz.	24.04
MCR Safety FR Gear, 88% Cotton / 12% Nylon	7.0 oz.	13.1
MCR Safety FR Gear, 100% Cotton	7.0 oz.	28.14
MCR Safety Nomex® IIIA 4.5 oz / yd ²	4.5 oz.	38.3
MCR Safety Nomex® IIIA 6.0 oz / yd ²	6.0 oz.	20.2
MCR Safety FR Gear, powered by Summit Breeze® 100% Cotton	7.0 oz.	-
MCR Safety FR Gear, powered by Summit Breeze® Inherent Blend	5.5 oz.	-
Summit Breeze®, 88% Cotton / 12% High Tenacity Nylon	7.0 oz.	9.05
MCR Safety Westex®, 88% Cotton / 12% High Tenacity Nylon	7.0 oz.	16.1

You can clearly see from the testing chart above that FRC made with Summit Breeze® technology is designed to perform with limited burn injuries. When compared to a non-vented 88/12 deluxe coverall, a vented 88/12 deluxe coverall powered by Summit Breeze® outperforms burn rate scores by 43%. In addition, only Summit Breeze® directs a great majority of gas away from the face, significantly minimizing inhalation injury. This is because Summit Breeze® technology allows toxic air and gases to naturally flow out of the vented arms and back. Toxic air and gases in garments without this venting will move to the closet exit point, which is most times directly below your mouth and nose.

MCR Safety hopes the takeaway from the above information is this: materials and venting matter when it comes to FR performance. When you face a hazard that can cause death or result in injuries that could cost well over \$200,000 in medical care costs, it only makes sense to wear the best FR protection one can buy.

For more on Summit Breeze® technology, please click [here](#). For more on NFPA 2112, please click [here](#).

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