

# Safety and Health

## *SAFETYSHARES!*

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### **Systolic and Diastolic Blood Pressures**

As we look anxiously to begin our return-to-work process, many of us have been scheduled for a physical exam. For those scheduled to work on projects involving hazardous materials for remediation, emergency response or handling such materials for recycling or transportation/disposal, the examining physician (or other licensed health care professional – PLHCP) may indicate that your physical may be applicable for one year or possibly 24 months: depending on the physician’s assessment. Vital signs, such as temperature, heart rate and blood pressure are the standard preliminaries that we have all come to know as part of any process to determine our fit-for duty.

I am sure we all know the standard blood pressure reading of “120 over 80” as the typical A-OK measurement for normal. But I feel I’m not alone here, when it comes to truly understanding what do these numbers really mean. The first number is referred to as the systolic measurement and the second number is the diastolic measurement. Both parameters are expressed in millimeters of mercury or mm Hg. As a reference, standard air pressure at sea level is 760 mm Hg. So, both systolic and diastolic pressures are significantly less than “normal” atmospheric air pressure.

Systolic is a Greek word meaning “a drawing together or a contraction.” It is the first beat heard during blood pressure taking. It measures the maximum pressure within the blood vessels when the heart contracts.

Diastolic is a Greek word meaning “drawing apart.” It is the last beat heard during blood pressure taking. It measures the minimum pressure within blood vessels when the heart is relaxed.

There are four chambers of the heart: right and left atrium and right and left ventricles. There are two valves preventing blood from flowing in between the chambers. During the systolic phase the ventricle and valve are closed and blood flows to the atrium. Once the atrium is filled with blood, blood flows to the valve which will open, and the ventricle relaxes. Blood will then flow from the atrium to the ventricle. The flowing and filling of the ventricles is known as the diastolic phase.

Blood pressure is set by:

- cardiac output - the amount of blood pumped by each ventricle in one minute; and
- peripheral resistance - the resistance that the heart has to overcome to make the blood flow through the blood vessels of your circulatory system.

According to the American Heart Association, the normal systolic pressure has a value ranging from 90 to 120 mmHg. The normal diastolic pressure ranges from 60 to 80 mmHg. Anything below or above these numbers would probably result in the occupational medical provider requesting a consultation from your primary health physician. There is even a chance that until this is done, our occupational health care provider may not sign the TPMC fit-for-duty form or may sign the form while detailing some restrictions for your assigned work tasks.

Below is a chart that illustrates various measurements of blood pressure and how they are interpreted as far as your cardiac health is concerned.

Blood Pressure Status	Systolic (mm Hg)		IF	Diastolic (mm Hg)	
	Min	Max		Min	Max
Normal Blood Pressure	< 120		and	<80	
Pre-hypertension	120	139	or	80	89
Stage I High Blood Pressure (Hypertension)	140	159	or	90	99
Stage II High Blood Pressure (Hypertension)	160	180	or	100	110
Hypertensive crisis (where emergency care is required)	> 180		or	>110	

High blood pressure, or hypertension has been called the "silent killer", because it often has no warning signs or symptoms, and many people do not even know they have it. Over time, the constant pressure overload causes accumulating damage that eventually becomes more than your circulatory system can handle, often leading to serious health problems.

Around 5-10% of people have a specific underlying medical condition that causes a malfunction in one or more of the physiological processes that maintain blood pressure; for example, chronic kidney disease or thyroid disease. However, the majority of people with high blood pressure have what is known as *essential hypertension*, meaning the cause is unknown.

Regardless of whether you have essential hypertension, or hypertension due to an underlying condition, it can increase cardiac output, the resistance to blood flow caused by the muscle tone and diameter of the blood vessels, known as peripheral resistance, or both. High blood pressure is dangerous because the higher your blood pressure gets, the harder your heart has to work to pump blood around your body, and the more likely your heart and blood vessels will be damaged. Without treatment, hypertension can cause a heart attack, enlargement of your heart, and/or heart failure. Your blood vessels may start to bulge, burst, or clog, and excessive pressure inside the vessels in your brain may cause a brain bleed leading to a stroke. In some cases, high blood pressure can also bring on kidney failure, blindness, and even cognitive impairment.

Obviously high blood pressure can cause some serious health conditions and if left ignored, we could be playing a dangerous game of Russian Roulette. We are fortunate that, due to our work assignments, our blood pressure is part of our mandatory physicals and therefore, do not need to make a special appointment with our personal physician; it comes with the job. The only thing we need to do is to recognize when our blood pressure falls outside of normal and then find out what we can do to control this condition.

**Good information is the best medicine.** - Michael E. DeBakey (cardiac surgeon, vascular surgeon, scientist and medical educator)