

## SIRCOVER

SIRCOVER is a computer program that calculates the siren coverage of a single siren or a square net of sirens. The program supports Whelen sirens. Temperature and humidity conditions are taken into account along with the attenuation due to barrier effects from buildings (building density).

### **Input data:**

#### **Building density:**

Building density levels from 0 to 9 can be specified. These levels correspond to the following types of built up areas:

Building Density Level	Shortform Name	Description
0	OP	Open flat area, land or sea
1	OL	Open low areas with residential houses no more than 1 storey, rural areas with well separated buildings
2		Open low areas with residential houses no more than 2 storey, rural areas with well separated buildings
3	DL	Dense low areas, houses are residential with 2 stories, business and residential areas (villages)
4		Dense low areas, houses are residential with 3 stories, business and residential areas (small towns)
5	M	Medium areas with 4 storey houses, business and residential areas (towns)
6		Medium areas with 5 storey houses, business and residential areas (towns)
7	OH	Open high areas with 5 – 10 storey buildings, urban areas with well separated buildings (cities or larger towns)
8		Dense high areas with 5 – 10 storey buildings, center areas of cities or larger towns
9	DH	Dense high areas 8 – 15 storey buildings, typical downtown high rise areas of large cities

**Meteorological data:**

Five standard meteorological conditions can be used:

**1. Dry desert (neutral)**

(Atmospheric pressure = 1 atm, Relative humidity = 13%

Temperature = 40° C and Temperature gradient = 0.0001 (neutral inversion))

This condition covers hot desert areas far away from coast lines. The neutral conditions are valid around sunrise and sunset. Slightly higher sound pressure levels can be expected at night time.

**2. Dry desert (extreme)**

(Atmospheric pressure = 1 atm, relative humidity = 13%

Temperature = 40° C and Temperature gradient = -0.02 (extreme negative inversion))

This condition covers hot desert areas far away from coast lines. The extreme inversion is valid around noon on days with low to moderate wind velocity.

**3. Humid tropic**

(Atmospheric pressure = 1 atm, Relative humidity = 84%

Temperature = 26° C and Temperature gradient = 0.05 (positive inversion))

This condition covers hot tropic areas with high humidity and somewhat hazy weather. Valid at all hours for most near coast areas in the tropic climate belt.

**4. European**

(Atmospheric pressure = 1 atm, Relative humidity = 79%

Temperature = 12° C and Temperature gradient = 0.005 (low positive inversion))

This condition covers a typical autumn or spring weather condition in the temperate climate belt. Valid at all hours most of the year except for hot summer or cold winter.

**5. Polar**

(Atmospheric pressure = 1 atm, Relative humidity = 80%

Temperature = -15° C and Temperature gradient = 0.02 (positive inversion))

This condition covers very cold conditions, typical polar areas. Valid at night and in cloudy weather.

### **Siren size:**

The program include data for Whelen type 2800 series siren of sizes from 1 cell to 9 cells and several other types of Whelen sirens.

### **Signal type:**

Seven different signal types (or measurement values) can be specified:

- |    |                          |                 |
|----|--------------------------|-----------------|
| 1: | All Clear                | (Danish signal) |
| 2: | Indoor Protection        | (Danish signal) |
| 3: | Best Possible Protection | (Danish signal) |
| 4: | Gas-proof Protection     | (Danish signal) |
| 5: | Pure tone (461 Hz)       | (Leq)           |
| 6: | Pure tone (461 Hz)       | (Max Level)     |
| 7: | Pure tone (461 Hz)       | (Max Peak)      |

### **Warning level:**

Warning level is the specified minimum level that is to be met. Values from 50 dB to 80 dB can be specified. All values are linear levels without frequency weighting.

### **Output data:**

The output data are divided into two sections, one for a single siren and one for a network in form of a square net of sirens.

#### **Single siren:**

The distance from the siren position to the circle where the sound pressure level equals the warning level is given in kilometers and square miles (last one in parentheses).

#### **Network sirens:**

The side length of the square formed by four sirens is given in kilometers and miles (last one in parenthesis) The warning level is met in the center between the four sirens. The area of the square (equals the covered area per siren) is given in square kilometers and square miles (last one in parenthesis).