

Recommended Air Changes per Hour

Air Change Rates by Room

This document serves to provide a basic list of non exhaustive environments with current air change recommendations. All ACH rates are dependent on the size of the room and the number of occupants, and should be used alongside the ACH formula. This list is subject to change based on government and legislative advice. Correct as of December 2021.

To find the volume of outside air needed to properly ventilate a space, you'll need to have an estimate of the typical number of people occupying it and know what the space will be used for. Then, simply use the table below to multiply the number of people by the required metres cubed per hour per person to determine the required fresh air flow.

The table below outlines reference values of air volume split by room usage according to DIN 1946 part 2. This is a standard set by the German Institute for Standardisation and is accepted worldwide.

Building / Room	Number of Air Changes per Hour
All spaces in general	4
Assembly Halls	4-8
Attic spaces for cooling	12-15
Auditoriums	12-15
Bakeries	20-30
Banks	4-10
Barber Shops	6-10
Bathrooms	3-8
Bars	20-30
Beauty Shops	6-10
Boiler Rooms	15-30
Bowling Alleys	10-15
Cafeterias	12-15
Chemical Stores	5+
Churches	8-15
Classrooms	6-20
Club Rooms	12+
Clubhouses	20-30
Cocktail Lounges	20-30
Computer Rooms	15-20
Court Houses	4-10

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Building / Room	Number of Air Changes per Hour
Cellars	3-10
Commercial Kitchens	30+
Compressor Rooms	10-20
Conference Rooms	8-12
Dairies	8-12
Dance Halls	6-9
Dental Centres	8-12
Pharmacies	6-10
Engine Rooms	15-30
Entrance Halls & Corridors	3-5
Factory Buildings	2-4
Factory Buildings with Fumes/Moisture	10-15
Fire Stations	4-10
Foundries	15-20
Fume Cupboards	40-50
Galvanising Plants	20-30
Garages (Repair)	20-30
Garages (Showroom)	6-8
Garages (Storage)	4-6
Gyms	6+
Hospital Rooms (Sterilising)	15-20
Hospital Rooms (Wards)	6-8
Hospital Rooms (X-Ray)	10-15
Kitchens (General)	15-60
Laboratories	6-15
Laundries	10-20
Lunch Rooms	12-15
Nightclubs	20-30
Machine Shops	6-12
Medical Centres	8-12
Medical Clinics	8-12
Medical Offices	8-12
Mills (Paper)	15-20

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Building / Room	Number of Air Changes per Hour
Mills (Textile General Buildings)	4
Mills (Textile Dye Houses)	15-20
Municipal Buildings	4-10
Museums	12-15
Offices (Public)	3+
Offices (Business)	6-8
Office Lunch Rooms	7-8
Office Copy Rooms	10-12
Office Computer Rooms	10-14
Paint Shops	10-15
Paper Mills	15-20
Photo Dark Rooms	10-15
Pig Houses	6-10
Police Stations	4-10
Post Offices	4-10
Poultry Houses	6-10
Precision Manufacturing	10-50
Public Buildings (Hallways)	6-8
Public Foyers	8-10
Public Restrooms	10-12
Public Smoking Rooms	15-20
Pump Rooms	5+
Railroad Shops	4+
Residences	1-2
Restaurants (Dining Area)	8-10
Restaurants (Food Staging)	10-12
Restaurants (Kitchens)	30+
Restaurants (Bars)	15-20
Retail	6-10
School Classrooms	6-20
Shoe Shops	6-10
Shopping centres	6-10
Shops (Machine)	5+

Building / Room	Number of Air Changes per Hour
Shops (Paint)	15-20
Shops (Wood Working)	5+
Showers (Public)	10+
Showers (Private)	6
Substation (Electric)	5-10
Supemarkets	4-10+
Swimming Pools	20-30
Taverns	20-30
Textile Mills	4+
Toilets (Public)	6-15
Town Halls	4-10
Theatres	8-15
Turbine Rooms (Electric)	5-10
Waiting Rooms (Public)	4
Warehouses	6-30+
Welding Workshops	15-30
Wood Working Shops	8+

When specifying a fan or ventilation system, one of the most important considerations is the number of air changes per hour (also known as air change rate) needed to sufficiently ventilate the room. It is equally crucial to take into account the volume of outside air (fresh supply air) that the room requires. This can be calculated based on the number of people typically living or working in the space. These requirements can depend on a number of factors but the nature of the room's usage is a key place to start.

Calculating the Air Changes per hour on the size of a room

Air changes per hour (ACPH) is a measurement of air volume that is added to, or removed from, a room divided by the total volume of the room. Put simply, it measures how many times the air in the room is replaced. Higher ACPH values mean better ventilation. The formula is as follows:

$$\text{ACPH} = Q / \text{Vol}$$

Whereby:

Q = Volumetric flow rate of air in cubic metres per hour (m³/h)

Vol = Space volume L × W × H in cubic metres (m³)

Calculating Fresh Air Requirements

To find the volume of outside air needed to properly ventilate a space, you'll need to have an estimate of the typical number of people occupying it and know what the space will be used for. Then, simply use the table below to multiply the number of people by the required metres cubed per hour per person to determine the required fresh air flow.

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