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Ideal Contact Washing Time

As according to DIN 10510

Contact time is the most important part of any washing and or cleaning process. It determines the time that a product or item is subjected to the influences of mechanical action (water), chemical action (detergents, surfactants, oxidents etc) and thermal action (temperature). The outcome can then be used to determine a process, which can be either cleaning, sanitizing, disinfecting or even sterilizing.

Please refer to our leaflet "How clean is it?" to learn more about the different cleaning processes.

There are quite a number of Standards that refer to disinfection and sterilization however in Australia, there is no National Standard that addresses the different requirements for sanitizing. The USA have NSF Standards, and of late the Europeans (Germans) have developed a DIN Standard. This is the one we refer to with our dishwashers and utensil washers. NSF stands for National Sanitation Foundation and DIN stands for Deutsches Institute für Normung.

The DIN Standard is an ideal method to calculate the minimum size machine you require. Please note this document only applies to commercial type machines as domestic dishwashers have separate standards.

Because of the different construction methods of the various dish and glass washers, the contact time has to be calculated in different ways. For example a multi-tank conveyor washing machine has a contact time based on distance and speed, whilst a single tank machine has a contact time based on time alone.

Therefore there are three different DIN standards:

- DIN 10510 refers to multi tank conveyor type washers
- DIN 10511 refers to glass washing machines
- DIN 10512 refers to single tank dishwashing machines

Method for calculating contact time for DIN 10511 and DIN 10512 is the same. According to DIN 10510, contact time is explained as follows:

'Zeitspanne, in der die Reinigerlösung auf das Spülgut einwirkt.'

Literally translated, Reinigerlösung means cleaning solution. The way that we interpret this is that the contact time is the time that the goods are in contact with water including chemicals that effect the cleaning process; i.e. not the final rinse.

According to DIN 10510 contact time is explained as follows:

"Die Einwirkzeit beginnt beim Eintritt in die Pumpenvorabräumung und reicht bis zum Eintritt in die Frischwasserklarspulung.'

The way that we interpret this is that the contact starts when the goods enter the first wet zone (mostly pre-wash zone) whereby water is pumped and sprayed, with or without chemicals, and ends when the goods enter the fresh water final rinse.

Recommended contact time

Although contact time is an important aspect of washing and cleaning, the method of making contact is vital to a good result. Correct temperatures to avoid baking on; appropriate chemicals to suit the soil level; good pump pressure and volume (too much

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can have just as much a negative impact as too little); good water quality (hardness, cleanliness etc); correct stacking and use of the machine, all the above can have a significant impact on the final result.

DIN standards have the following recommendations:

- DIN 10510 - minimum 120 seconds
- DIN 10511 - minimum 90 seconds
- DIN 10512 - minimum 90 seconds

How to calculate for single tank dish/ glass washers.

The actual wash cycle of these machines, excluding the final rinse should be 90 seconds. A 15/20 second final rinse follows the wash making the average cycle time 120 seconds or 2 minutes.

Most single tank under-bench and pass through dishwashers use 50 x 50 cm racks. Allowing for loading/unloading the practical capacity of these machines is 20 to 25 racks per hour.

The same applies for glass washers but they also come with 40 x 40cm racks. This means the quantity to be washed is lower but racks/hour is the same.

How to calculate contact time for conveyor dishwashers.

Although many manufacturers market their machines at 'plates per hour', this does not give an indication of what size machine is required for a specific job. Plates per hour depends on plate size and conveyor width. Also, the contact time given by DIN is based on an average soil level and is calculated to achieve a sanitised outcome.

A rule of thumb calculation is to assume a plate would occupy 10cm of conveyor (or dishrack) length if placed perpendicular to conveyor travel direction. The required width depends on plate diameter. Allowing for a standard 10" (250mm) plate, a standard dishwasher conveyor (or rack) will hold 2 plates next to each other per 10cm of length. You can use a similar calculation for other items. For example; cups might be 5 per 10 cm length etc.

Calculating time required:

Let's assume you need to wash (amongst other items) 1,000 plates. How long will it take to wash 1,000 plates using a basic conveyor machine?

At 2 plates per 10cm of conveyor length: 500 x 10cm = 5,000 cm.

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Add the total length of the pumped zones ONLY. On most machines, these are either 900, 1,100mm or longer. Assuming the basic machine has a pre-wash and a power wash, the total pumped zone length will be 1,800mm (1.8metre).

The minimum requirement is 120 second contact time.

The conveyor speed of the machine must therefore be: 1,800mm -/- 120 sec = 900 mm/60 sec or 0.9mtr/min.

We have calculated we need 5,000 cm or 50 metres of conveyor to wash 1,000 plates.

50 mtrs -/- 0.9 mtr/min = 55.6 minutes to wash 1,000 plates

If you add another tank section to the machine then the wash time would be:
2,700mm -/- 120 sec = 1,350 mm/60 sec or 1.35 mtr/min.

50 mtrs -/- 1.35 mtr/min = 37 minutes to wash 1,000 plates.

Calculating machine size required:

You need to wash 1,000 plates in 20 minutes. What size machine or conveyor speed do I require?

Using the above example we require 5,000cm or 50 mtrs of conveyor length.

50 mtrs -/- 20 mins = 2.5 mtrs/min conveyor speed is required.

In 120 sec the conveyor would have travelled 2 x 2.5mtrs = 5 mtrs.

The machine power section would have to be 5 mtrs long plus inlet, outlet and final rinse section.

Rack or belt conveyor?

The above calculations apply to both types of machine.

A continuous belt machine is as the name says a dishwasher with a conveyor belt running through the various stages. Depending on items to be washed the loading is easier and slightly more efficient, but they cannot turn corners so a 5 mtr long wash section might end up being a machine over 8 mtrs in length.

The other type of conveyor is a machine using standard plastic 50 x 50 cm washing racks. Again depending on the variety of items being washed the loading is not as efficient as a continuous conveyor. Apply a 10% margin to the required conveyor length.