CINET
Professional Textile Care

Benchmark Study

INDUSTRIAL WASHING AND DRYING

up to 2,2 times more sustainable compared to On Premise Laundry

TKT

TKT is the Dutch technical knowledge centre for the textile care industry, for both the dry cleaning industry and the laundry industry. TKT initiates and coordinates technical and sustainable innovation projects for the Dutch and the International textile care industry. TKT is imbedded in international and networks and has extensive expertise about technological aspects of cleaning and washing such as (amongst others) sustainability of cleaning, alternative cleaning processes, energy saving, hygiene of cleaning and washing, life cycle assessments, environmental legislation for dry cleaners & laundries, textile functionalities and their relationship to washing processes. There are many ongoing projects about these aspects. Additionally, practical knowledge is transferred to the companies in the form of online educational material, both on a national and on an international level. TKT is closely affiliated to the Dutch national associations FTN (laundry) and Netex (dry cleaning), as well as the umbrella association CINET (the international committee of professional textile care).

Introduction

This project provides a sustainability comparison between washing on location (OPL: On Premise Laundry) and washing in an industrial textile service company. The reason for this project is the fact that many care facilities treat their laundry (partly) on location, while at the same time maintaining a contract with a textile service company. A situation often encountered demonstrates laundry, such as bed linen and towels, being outsourced to a textile service company, while especially personal clothing of residents is treated on location. FTN commissioned this study, which was executed by TKT in cooperation with TNO Industry & Technique, to determine whether it is more sustainable to also outsource personal clothing to a textile service company. The project was executed with a FTN user group.
Six OPL locations have been chosen in consultation with this user group, where after they were visited by TNO. The chosen locations constituted five nurse- and care homes and one family replacing home for disabled people. In these six locations, the following aspects have been investigated with regard to washing on location:

- Machinery
- Type of laundry
- Energy consumption
- Water consumption
- Laundry production per week
- Productivity per hour
- Hygiene protocols
- Proces- and quality control
- Occupational health service and safety
- Run time of laundry
- Laundry wear
- Water pre-treatment (water softening)

The results were determined based on observations during the visit, interviews with personnel in the care institutions, weighing of laundry loads, direct measurement of energy consumption and checklists and forms filled out by the washing personnel. A calculation model has been used to check the filled out data on consistency. This model determined whether the number of charges, loading factor, kg per charge and total week production formed a consistent whole. This proved to be the case. Table 1 shows the results of the six locations; the number of residents and the type of laundry washed on location.

Location	Number of clients	Type of cleaned laundry						Organisation
		Bedlinen	Towels	Personal clothing	Under garments	Pyjamas	Cleaning cloths, lace.ne curtais, etc	
1	140				X		X	Nurse- and care home
2	135	X		X	X	X	X	Nurse- and care home
3	85			X	X	X	X	Nurse- and care home
4	65		X	X	X	X	X	Nurse- and care home
5	330			X		X	X	Nurse- and care home
6	18	X	X	X	X	X	X	Family replacing home for disabled people

Table 1. Results of the six locations; number of residents and types of laundry washed on location.

In The Netherlands, about 40% of the total amount of laundry washed yearly for care institutions is outsourced to a textile service company. About 60% (circa 50 million kg) is washed on location.

On premise laundry vs textile care company: consumption of energy and water

Sustainability of on premise laundry

For every location, the consumption of energy and water per kg laundry has been determined by means of verification of machinery, energy consumption of machinery and load factor. The white and colored laundry load factor has been determined around 60%. The delicate laundry load factor has been determined around 37%. Table 2 displays the energy consumption per kg laundry, on basis of this data. The consumption has been indicated in gross energy.

Like shown, a large diversity is present with regard to consumption of gross energy of wash- and dry processes. The reason for this is found in the work processes and the operated machinery, in particular the energy source used for heat generation. Heat generation by means of electricity is especially unfavorable, in terms of gross energy. This is displayed in the data of locations 1, 3, 4 and 6.

Locations 2 and 5 use gas fired dryers and the water for the washing machines is heated with an external gas fired boiler. These locations are also the only locations where softened water is used for washing.

For rinsing, none of the locations use softened water. Washing on location causes a water consumption of around 25 liter/kg.

Location	Specific energy consumption (MJ gross energy/kg)			
	Washing	Drying	Total	Total average
1	4	3	7	7,8
2	2,3	3	5,3	
3	3,7	6,4	10,1	
4	3,3	6,4	9,7	
5	1,8	3	4,8	
6	3,6	6,4	10,0	

Table 2. Energy consumption for washing and drying of one kg laundry in the specific locations.

Sustainability of industrial washing

Energy consumption of washing- and drying processes in a textile service company have been determined by TNO and the user group. For washing of bed linen and towels, the process characteristics are as follows: a washing tunnel with a washing process at of 75 °C, heat regeneration and pressurized dewatering. For drying of laundry, a gas wringer is used. The total gross energy consumption of laundry washed and dried this way is 4,1 MJ/kg.
In an industrial setting, personal clothing is treated in open-end machines in a washing process of 55 degrees, steam heated spin dryer and a gas dryer or gas finisher. The consumption of gas and electricity and the conversion to gross energy are based on experience data from the sector and calculations of TNO Industry & Technique. The total gross energy consumption for personal clothing, washed in open-end machines and dried in a gas fired dryer or gas finisher, is determined on 4,7 MJ/kg. Water consumption in this industrial situation is determined around 12 liter/kg for the mentioned textile classifications.

Sustainability comparison

When comparing these numbers for washing and drying with table 2, it can be concluded that, in general, industrial washing- and drying processes are significantly more sustainable. Using the right machinery in on premise laundry, the numbers can almost be matched. However, since this will be impossible to realize in many locations, this cannot be viewed as representative. Due to safety reasons and/or technical aspects of the building, use of gas fired dryers and with gas heated water will not be possible in most locations. Assuming an average energy consumption in the locations, washing and drying on location causes an average of 1,7 times as much environmental impact, compared to an industrial situation, with tops of 2,2 times as much environmental impact. On top of that, water consumption on location is determined to be twice as high.

Results other aspects

Besides energy consumption, there are several other aspects that are important for the quality of the total process.

Productivity
In the visited locations, the combination of work procedures and machinery leads to a productivity of somewhat more than 6 kg laundry per worked hour. This parameter was not subject to a lot of dispersal.

Hygiene, process- and quality control
Hygiene is a combination of work- and washing processes. On the visited locations, a high diversity in hygiene care has been encountered. On that note, it must be mentioned that not one of the visited locations has a quality system in place. Also, no administration is kept of the activities. Finally, use of softened water is only applied very limitedly in the visited locations. Softened water simplifies stain removal, lessens wear of the textile and is better for the machinery, which makes it an important precondition for good washing processes.

Occupational health service and safety
In the visited locations, the larger machines have been arranged on a platform to simplify the loading and unloading. The unloading of machines with a capacity of 13 kg and larger is often experienced as heavy, especially with regard to wet laundry from the washing machines. In the rooms, which are often small, containers with laundry quickly become an obstruction of emergency exits.

Conclusion

It has been determined that “on premise laundry” presents a large diversity of machinery, washing processes and consumption of energy and water. On average, washing on location causes 1,7 times more environmental impact per kg laundry, compared to industrial washing, with tops of 2,2 times more environmental impact. Softened water for washing is only used in 33% of the situations and not at all for rinsing. The productivity is determined on 6,3 kg laundry per worked hour and is not subject to a lot of dispersion in the 6 locations. The hygiene care – not unimportant in care institutions – turned out to be inconsistent, and was not based on quality systems. The quality systems were absent, as was the case with administration of proceedings, meant to guarantee safeguards.

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