WASHEX LAUNDRY MACHINES INSTALLATION ENGINEERING GUIDE

WASHEX
Manufacturer of WASHEX and CHALLENGE Products

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SECTION 1. MACHINE DATA

1-1. MACHINES

For model specifications, features, electrical data, valve data, motor data and outline dimensions refer to the following publications:

MODEL	SALES BROCHURE	OUTLINE DIMENSIONS
RVS – RIGID-MOUNT, VARIABLE SPEED END-LOADING WASHER / EXTRACTORS		
RVS 350	WLSB-501	TDA7763
RVS 550	WLSB-501	TDA7766
FVS – FLOATAIRE® VARIABLE SPEED END-LOADING WASHER / EXTRACTORS		
FVS 450	WLSB-502	TDA7757
FVS 600	WLSB-502	TDm7790
FVS 800	WLSB-502	TDA7725
FVS 1200	WLSB-503	TDA7803
FLPS – OPEN-POCKET, END-LOADING, TILTING, FLOATAIRE® WASHER / EXTRACTORS		
FLPS 1200	WLSB-503	TDA7811
FLPS 2250	WLSB-503	TDA7812
FLPS 2500	WLSB-503a	TDA7787
FLA – SIDE-LOADING, FLOATAIRE® WASHER / EXTRACTORS		
FLA 1100	WLSB-504	CS-5999
FLA 1600	WLSB-504	CS-5997
FLA 2100	WLSB-504	CS-6032
FLA 3000	WLSB-504	CS-6034
ACC – ANTI-CROSS CONTAMINATION FLOATAIRE® WASHER / EXTRACTORS		
ACC 1100	WLSB-505	TDA7804
ACC 1600	WLSB-505	TDA7786
ACC 2100	WLSB-505	CS-7224
ACC 3000	WLSB-505	CS-7653

SECTION 2. MACHINE MOUNTING

2-1. GROUND FLOOR

Refer to the detailed specifications for each machine to determine the static and dynamic loads. The anchoring and trough drawings for each machine contain information on anchor bolt placement. Anchor bolts are furnished with all machines.

Proper leveling and grouting is a machine installation requirement. Failure to comply with these instructions may void the machine warranty.

2-2. ABOVE-GROUND FLOOR

For above-ground installations, floor construction must support the static and dynamic load of the machine when fully operational. It is important to determine that the natural frequency of the building does not coincide with the frequency generated by the machine. It is important to verify the floor construction is adequate. If in doubt abou tfloor specifications, contact the Washex Sales Engineering Department before proceeding.

CAUTION

Floor must support the static and dynamic load of the machine when fully operational. It is important to verify that floor construction is adequate.

SECTION 3. WATER DRAIN

3-1 WATER USAGE FOR LAUNDERING

Refer to SB-438 for further information.

3-2 DRAIN TROUGH

WASHEX end-loading machines can either be connected directly to the sewer pipe or discharged into a drain trough. Side-loading machines require a drain trough which must be large enough to contain the rapidly drained water without overflowing. WASHEX Marketing Technical Support Group will furnish detailed drain trough drawings. Trough capacities for single machines are shown in Table 3-1.

TABLE 3-1. DRAIN TROUGH CAPACITY

	END-LOADING									SIDE-LOADING			
WASHEX MODEL	**RVS 350**	**FVS 450**	**RVS 550**	**FVS 600**	**FVS 800**	**FVS 1200**	**FLPS 1200**	**FLPS 2250**	**FLPS 2500**	**FLA 1100**	**FLA 1600**	**FLA 2100**	**FLA 3000**
Trough gal.*	60	60	75	75	75	110	110	200	250	100	150	200	300
Capacity liters	230	230	285	285	285	420	420	760	950	380	570	760	1140

*GALLONS ARE U.S. MEASURE

3-3. SEWER PIPE

The drain pipe of an end-loading machine can be piped directly to the sewer pipe provided the sewer pipe size is larger than the drain pipe. If the sewer pipe is smaller, the machine must drain into a trough.
All side-loading machines must drain into a trough.

The sewer pipe connected to the drain trough must be sized large enough to empty the trough in 45-60 seconds. If a number of machines drain into a common trough, the sewer pipe size is calculated as follows:

1. Determine the **total trough capacity** by adding the trough capacity required for each machine **(Table 3-1).**

2. Calculate **design capacity** by multiplying the total capacity by the appropriate modification factor in **Table 3-2.**

3. Select from **Table 3-3** the sewer pipe size that matches the design trough capacity. If the design capacity falls between pipe sizes, select the larger pipe size, *i.e., if the trough is 400 gal, use a 6" pipe rather than a 5" pipe.*

TABLE 3-2. MULTIPLE MACHINES TROUGH MODIFICATION FACTORS

No. of Machines	**1 - 2**	**3 - 4**	**5 - 6**	**7 - 8**	**9 - 10**
Modification Factor**	1.00	0.85	0.75	0.60	0.50

•• Design capacity equals the total capacity multiplied by the modification factor.

TABLE 3-3. SEWER PIPE SIZE & CAPACITY

U.S. Measure	**inch**	3	4	5	6	8	10	12
	gpm	1.00	200	350	550	1,000	1,800	2,800
Metric	**mm**	75	100	125	150	200	250	300
	lpm	380	760	1325	2082	3785	6815	10600

EXAMPLE:

Determine the drain trough capacity and sewer pipe size required for an installation with these WASHEX machines: **1 - FLPS 2500, 1 - FLA 1600, 1 - RVS 550**.

1. Total trough capacity (Table 3 -1):

1 - FLPS 2500 = 1 @ 250 gal = 250 gal
1 - FLA 1600 = 1 @ 150 gal = 150 gal
1 - RVS 550 = 1 @ 75 gal = 75 gal
Total trough capacity = **475 gal**

2. Design trough capacity

Design capacity =Total capacity x modification factor **(Table 3-2)**
= 475 gal x .85 = **404 gal**

3. Sewer pipe size

Design capacity = **404 gal**
From **Table 3-3 select a 6" sewer pipe** which has a capacity of 550 gpm.

SECTION 4. UTILITIES

4-1. WATER

For productivity, quality, and efficiency, it is essential that the water supply system (softeners, tanks, pumps, heaters, piping, etc.) be adequately sized to provide

- the required hourly consumption, and
- the momentary peak demands.

A. AVERAGE HOURLY WATER CONSUMPTION in the washroom varies according to the poundage processed,the type of work, and the wash formulas. First, determine the required hourly production and then multiply this poundage by the typical water consumption figure given in **Table 4-1**. (In actual operation, the total amount ofwater used may be considerably less.)

TABLE 4-1. WATER CONSUMPTION

TYPE LAUNDRY	Hot Water		Cold Water		Total	
	gal / lb	liter / kg	gal / lb	liter / kg	gal / lb	liter / kg
Lodging	1.0	8.5	1.0	8.5	2.0	17.0
Institutional	2.0	17.0	1.0	8.5	3.0	25.5
Commercial	2.0	17.0	1.0	8.5	3.0	25.5
Linen Supply	2.5	21.0	1.0	8.5	3.5	29.5
Industrial	2.5	21.0	1.5	13.0	4.0	34.0
Diaper	2.5	21.0	1.5	13.0	4.0	34.0

* This engineering guide is intended to serve as a helpful guide in sizing laundries and estimating utility costs. Obviously, from one specific situation to another, there will be variations in such matters as water consumption, electrical usage, poundage generated by a particular type of facility, and the number of loads processed per hour by a washer/extractor. It would be to your advantage to use actual figures when they are available. *When questions arise, feel free to contact the Washex Service Department at 1-800-433-0933.*

EXAMPLE:

Determine the hourly water consumption for an institutional laundry that washes 2400 lb/hr (see **Table 4-1).**

Hot water	=	2400 lb/hr	x	2 gal/lb	=	4800 gal/hr
Cold water	=	2400 lb/hr	x	1 gal/lb	=	2400 gal/hr
Total water consumption					=	7200 gal/hr

B. MOMENTARY PEAK DEMAND. All components of the water system should be designed to fill the machines at a rate of approximately 1/2 gpm per pound of rated load capacity of a machine. At that flow rate, it takes about 30-45 seconds to fill a machine to rinse level.

In a multiple machine installation it is unlikely that all machines will fill simultaneously. Thus, peak demand is based on the flow requirements of the largest machine **(see Table 4-2)** plus a percentage of the demand of the additional machines **(see Table 4-3)**.

TABLE 4-2. MOMENTARY WATER DEMAND

WASHEX MODEL	END-LOADING									SIDE-LOADING			
	RVS 350	FVS 450	RVS 550	FVS 600	FVS 800	FVS 1200	FLPS 1200	FLPS 2250	FLPS 2500	FLA 1100	FLA 1600	FLA 2100	FLA 3000
Fill gpm	35	35	60	60	60	130	130	200	250	120	150	200	300
Rate lpm	135	135	230	230	230	490	490	760	950	455	570	760	1140

TABLE 4-3. WATER DEMAND MODIFICATION FACTORS

No. of Machines		1	2 - 4	5 - 7	8+
	hot	1.00	0.50	0.40	0.30
Modification Factor*	**cold**	1.00	0.25	0.20	0.15

*Total momentary demand equals the demand of the largest machine plus the factored demand of the additional machines.

The water header shall then be sized based on flow rates in **Table 4-4** so that the water velocity shall not exceed 15 ft/sec (4.5 m/sec) except on short runs.

TABLE 4-4. WATER FLOW RATES IN PIPES

U.S. Measure	**inch**	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
	gpm	20	50	75	150	225	360	600	900	1400
Metric	**mm**	25	32	50	50	65	76	100	125	150
	lpm	75	190	570	570	850	1300	2250	3400	5300

NOTE

Install manual shut off valves on the hot and cold water lines to each machine.

CAUTION

Make sure all manual shut off valves are installed in a convenient location so the operator can reach them quickly in an emergency.

EXAMPLE:
Determine the momentary peak demand, and size the hot and cold water headers for an installation with these WASHEX machines:

2 - FLA 3000
1 - FLA 1600
1 - RVS 550

1. Momentary peak demand (see **Tables 4-2** and **4-3**).

a.. **Hot water.** For four machines, the momentary peak demand is the momentary demand of the largest machine (FLA 3000 @ 300 gpm) plus 50% of the demand for the other three machines:

Hot water demand = 300 + .5 (300 + 150 + 60) = 300 + .5 (510) = **555 gpm**.

b. **Cold water**. The peak demand is the momentary demand of the largest machine (FLA 3000) plus 25% of the demand of the remaining three machines.

Cold water demand = 300 + .25 (300 + 150 + 60) = 300 + .25 (510) = **428 gpm**

2. **Water header size** (see **Table 4-4**).

a. **Hot water header** is sized for a flow rate of **555 gpm**.
Select a **4" header** (up to 600 gpm).

b. **Cold water header** is sized for a flow rate of **428 gpm**.
Select a **4" header**.

c. **Water Pressure** - Although it is uncommon, water pressure can exceed 100 psi. If water pressure exceeds 100 psi at the installation site, install a pressure regulator ahead of the machine to reduce the pressure to below 100 psi. This will protect the water inlet valves from excessive pressure.

4-2. STEAM

About two-thirds of the energy consumed in a laundry is used to heat water for washing. To save energy, many laundries are now using “low temperature” wash formulas and installing waste water heat reclaimers. Hot water systems, therefore, can vary dramatically. They are custom engineered and designed to meet the individual needs of each plant.

The energy figures given in Table 4-5 are approximate and should be used only as a guide if no other data is available. For example, hot water temperature is assumed to be 160 F (71° C) and no heat reclaimer is contemplated. If higher temperatures are required to wash more heavily soiled loads, live steam can be injected into the machine. Steam for this purpose should be supplied at 60-100 psi (4-7 bar). The steam pipe size for each WASHEX machine is shown in the technical bulletins, referenced in Section 1-1. For a multiple machine installation the steam pipe header size is equal to the pipe area of the largest machine plus the total pipe area of the remaining machines multiplied by the modification factor in **Table 4-6**. Select the pipe header size which matches the total equivalent pipe area.

TABLE 4-5. ENERGY RQUIRED TO HEAT WATER

TYPE LAUNDRY	ENERGY TO HEAT WATER TO 160° F (71° C)		ENERGY FOR SUPPLEMENTAL STEAM INJECTION		TOTAL ENERGY REQUIRED	
	Btu / lb of wash	kcal / kg of wash	Btu / lb of wash	kcal / kg of wash	Btu / lb of wash	kcal / kg of wash
Lodging	1200	700	500	300	1700	1000
Institutional	2400	1300	500	300	2900	1600
Commercial	2400	1300	500	300	2900	1600
Linen Supply	3000	1650	750	400	3750	2050
Industrial	3000	1650	750	400	3750	2050
Diaper	3000	1650	500	300	3500	1950

TABLE 4-6. STEAM HEADER MODIFICATION FACTORS

No. of Machines	1	2 - 5	6 - 8	9 or more
Modification Factor*	1.00	0.50	0.40	0.30

*** Total required pipe area =** 100% of the largest pipe plus the total pipe area of the additional machine multiplied by the modification factor.

NOTE

Install a manual shut-off valve on the steam line to each machine.

Make sure all manual shut-off valves are installed in a convenient location so the operator can reach them quickly in an emergency.

EXAMPLE:

Determine the steam pipe header size for injecting supplemental steam for an installation with these WASHEX machines:

WASHEX	PIPE SIZE	PIPE AREA (see Table 4-7)
2 - FLA 3000	2”	3.355
1 - FLA 1600	$1\frac{1}{2}$”	2.036
1 - RVS 550	1”	0.864

Equivalent pipe area = 3.355 + .5 (3.355 + 2.036 + 0.864) = 3.127 + .5 (6.255) = 6.48 sq in from area closest to 6.48 sq in is the 7.393 sq in area of a 3" pipe.

NOTE

Always select the size larger rather than smaller to the equivalent area. Therefore: Select a 3" steam pipe header.

TABLE 4-7. PIPE SIZES

Inside Area			Inside Area		
Pipe Size	sq in	mm²	Pipe Size	sq in	mm²
1/2	0.304	196	2	3.355	2165
3/4	0.533	344	2 1/2	4.788	3088
1	0.864	558	3	7.393	4769
1 1/4	1.495	965	4	12.730	8213
1 1/2	2.036	1313	5	20.006	12907

NOTE

Steam pressure must not exceed 100 psi

4-3. COMPRESSED AIR

Each WASHEX machine must have a dependable and adequate supply of clean, dry compressed air as specified in **Table 4-8**

TABLE 4-8. COMPRESSOR SIZE

WASHEX MODEL	COMPRESSOR HP	100 psig cfm	7 bars cmh
FVS 450, 600, 800	1/3	4	1.7
FVS & FLPS 1200	1/3	6	1.7
FLA & ACC 1100 & 1600	1/2	4	3.4
FLPS 2250; FLPS 2500; FLA & ACC 2100 & 3000	3/4	8	5.1

In addition to the WASHEX machines, other air-operated equipment is used throughout most laundries. Feeders, folders, presses, etc., all require air. Therefore, to select the proper size air compressor, add up the amount of air required by each piece of equipment, assuming they all function simultaneously. Select the standard size compressor which exceeds the minimum volume by about 10%. To avoid problems and reduce maintenance, the compressor should be equipped with a receiver tank, air filter, dryer, and air cover. Provide a manual shut off on the air line feeding each machine.

NOTE

Make sure all manual shut-off valves are installed in a convenient location so the operator can reach them quickly in an emergency.

4-4. ELECTRICAL

Refer to technical bulletin "Branch Circuit Protection and Wire Sizes-Washex Laundry Machines" (3T-15) to use as a guide to help determine breaker sizes.

Although each machine must have its own circuit breaker for branch-circuit protection, it is unlikely that all machines in a multi-machine installation will be drawing maximum current at the same time. Thus, the size of the distribution panel is determined by the size circuit breaker (see Table 3T-15) of the two largest machines plus a percentage of the circuit breaker size of the remaining machines per Table 4-9.

TABLE 4-6. DISTRIBUTION PANELSIZE MODIFICATION FACTORS

No. of Machines	**3 - 4**	**5 - 6**	**7 - 8**	**9 - 12**	**13 or more**
Modification Factor*	.060	0.50	0.45	0.40	0.35

*Panel size equals 100% of the two largest machines plus the factored circuit breaker sizes of the remaining machines.

EXAMPLE:

Determine the size distribution panel required for an installation with the following WASHEX machines on 240/60/3 electrical system:

2 - FLA 3000 @ 125 amps
1 - FLA 1600 @ 70 amps
1 - RVS 550 @ 50 amps

Distribution panel size = 125 +125 = 250 (70 + 50) = 120 x 0.60 = 72 + 250 = **322 amps**

To determine the total electrical service requirements for the entire laundry, add the 322 amps required by WASHEX to the total amps required by all other equipment and electrical devices in the laundry.

NOTE

The National Electrical Code requires a minimum of 42 inches working aisle in front of the electrical panel. For installations outside the USA consult local electrical codes.

Machines equipped with variable speed drive units require particular attention to the electrical installation.