

THE ROTORDISK™ PROCESS

The ROTORDISK™ package wastewater treatment system is specifically designed for small flow off-sewer treatment requirements ranging from 500 to 100,000 GPD. There are numerous installations worldwide. Applications include resorts, subdivisions, highway service centers, individual homes, factories, hospitals, mining and exploration camps, leachate treatment, and various industrial applications.

The ROTORDISK™ treatment process consists of various stages; primary clarification, aerobic treatment, and secondary clarification. For advanced wastewater treatment (AWWT), nitrification, denitrification, disinfection, and phosphorus removal systems can be applied. The BUGS™ filtration device can be incorporated to provide a totally integrated ROTORDISK™ AWWT system.

Superior process stability is provided using the ROTORDISK™. Designed hydraulic retention times far exceed industry standards. A patented active recirculation feature from the Rotorzone provides dissolved oxygen to the primary clarifier. This feature also provides continuous organic feed to the primary clarifier during low flow periods. Integral sludge storage for a minimum of 9 months is also an advantage of the ROTORDISK™ system.

Mechanical simplicity of the ROTORDISK™ is attained since there is one drive system, and no need for compressors or skilled labour. In addition, ROTORDISK™ offers advantages over conventional suspended growth package plants; no aeration requirement, quiet operation, and energy costs are cut by two-thirds.

THE NATIONAL SANITATION FOUNDATION (NSF)

The NSF is a non-commercial, non-official agency. It is incorporated under the laws of Michigan as a not-for-profit organization devoted to research, education, and service. It's fundamental principle of operation is to serve as a neutral medium in which business and industry, official regulatory agencies, and the public come together to deal with problems involving products, equipment, procedures, and services related to health and the environment.

FIGURE 1: ROTORDISK™ S-12 UNIT

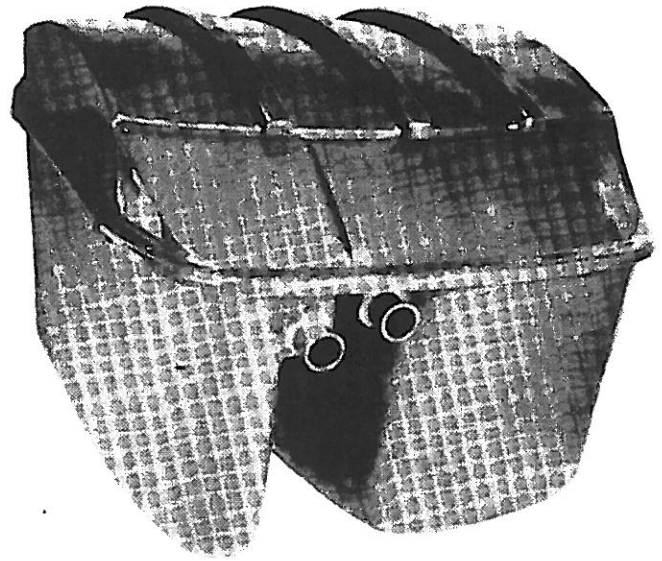
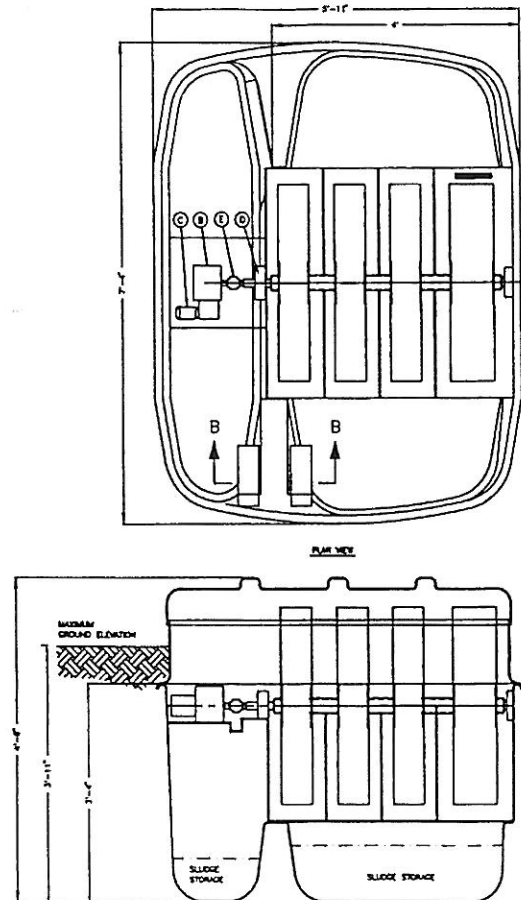


FIGURE 2: S-12 GENERAL ARRANGEMENT



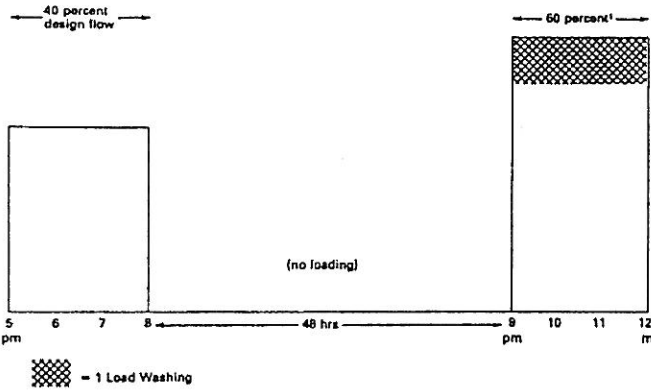
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES		CMS GROUP INC. 140 SHORE BLVD. UNIT 25 CHICAGO, ONTARIO, CANADA L4K 4C1 TEL: (905) 880-7580 TOR (416) 447-4884 FAX: (905) 880-0243			
TOLERANCES					
DECIMALS	ANGULAR				
.XX ± .05	± 0.5°				
.XXX ± .010					
DO NOT SCALE DRAWING					
DRAWN:	DATE:	GENERAL ARRANGEMENT OF S12 ROTORDISK IN FIBERGLASS TANK			
HOANG	01/17/95	SIZE	JOB NO.	DWG NO.	REV
CHECKED	SCALE	D		S12-20-D	
PROJECT NAME :					SHEET OF

STRESS TESTING PROTOCOL

The purpose of stress testing was to simulate actual ROTORDISK™ performance for various scenarios. These scenarios included equipment or power failure, wash day loading, one week vacation, and a working mother situation. Each test involved variations in design flow loading as depicted in the following schematics:

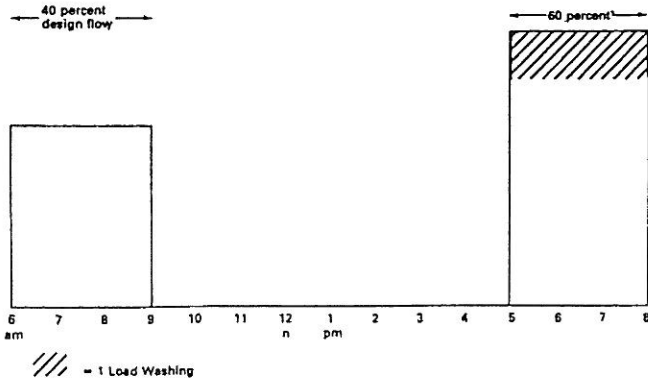
EQUIPMENT OR POWER FAILURE

All power to plant off for 48 hours, 1 time only



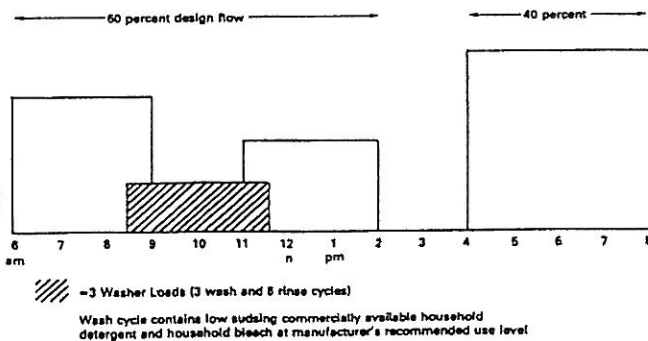
WORKING MOTHER

No loading 9 am to 5 pm for 5 consecutive days



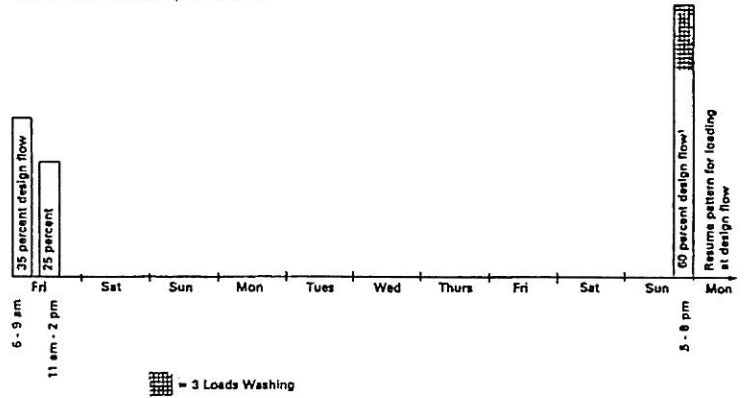
WASH DAY LOADING

Added to plants 3 times in one 5-day week with one 24-hour period between each loading



ONE WEEK VACATION

No loading over 9-day period but all power on
Sudden shock when family returns home



STANDARD NO. 40

The scope of Standard No.40 was to evaluate the ROTORDISK™ as manufactured by CMS Group Inc. Tests were conducted for a minimum of 6 months. All samples were collected and analyzed on a five day per week basis. The daily composite samples consisted of flow proportional samples collected at least once per hour during the periods of influent flow.

During the performance evaluation, the treatment plant was hydraulically loaded at 500 GPD according to the following pattern of flow:

6:00 am - 9:00 am	35% of daily flow
11:00 am - 2:00 pm	25% of daily flow
5:00 pm - 8:00 pm	40% of daily flow

TESTING OUTCOME

Based on the response of the ROTORDISK™ S-12 unit to these various loads, the sewage treatment plant as manufactured by CMS Group Inc., passed Class 1 classification in the 1981 NSF testing procedure. This plant did not incorporate filters or auxiliary equipment in its operation. As a result of the testing procedure, the removal efficiencies for BOD₅ and suspended solids are shown in Table 1. Plants listed for Class 1 effluent must also be shown to meet EPA Secondary Treatment Guidelines as specified for BOD₅ and suspended solids, as shown in Table 2.

TABLE 1: REMOVAL EFFICIENCIES

Parameter	Influent Mean	Effluent Mean	Percent Reduction
BOD ₅ (mg/L)	160	12	93
S.S. (mg/L)	170	6	96

TABLE 2: PLANT SPECIFICATIONS

Effluent Quality	Class 1 Max. Value*	Class 2 Max. Value*
BOD ₅ (mg/L)	20	60
S.S. (mg/L)	40	100

* Maximum value not to be exceeded more than 10% of the time.

TABLE 3: SUMMARY OF PERFORMANCE DATA

Period 10/11/81 - 5/10/82		MEDIAN	MINIMUM	MAXIMUM	INTERQUARTILE RANGE
Dissolved Oxygen (mg/L) 12:00 pm	aeration chamber	5.4	0.2	9.4	4.7 - 6.6
	effluent	5.4	1.4	10.0	4.8 - 6.0
Temperature (°C) 12:00 pm	influent	10.7	8.0	18.0	9.5 - 13.3
	aeration chamber	9.2	2.0	16.0	7.1 - 10.6
	effluent	7.3	2.0	17.0	5.6 - 9.5
pH	influent	7.4	6.8	8.0	7.3 - 7.6
	aeration chamber	7.8	7.0	8.1	7.7 - 7.9
	effluent	7.7	6.4	8.2	7.6 - 7.9
BOD ₅ (mg/L)	influent	160	12	530	130 - 200
	effluent	12	4	34	10 - 14
Suspended Solids (mg/L)	influent	170	47	373	128 - 220
	aeration chamber	78	15	272	46 - 100
	effluent	6	3	38	5 - 10
Volatile Suspended Solids (mg/L)	influent	78	56	94	74 - 81
	aeration chamber	76	54	82	73 - 79
	effluent	76	33	100	67 - 83
Settleable Solids 30 min. (mg/L)	aeration chamber	< 20	NOT APPLICABLE	20	NOT APPLICABLE

Median: 50% of the values are less than or equal to this value.

Interquartile Range: The range of variability about the median which is sufficient to contain 50% of the observations. It lies between the upper and lower 25% of the observations.

REPRESENTED BY:



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