STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for COLDWELLS REDESIGN.SWS

Pipe Sizes COLDWELLS Manhole Sizes COLDWELLS

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	40
Ratio R	0.399	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for COLDWELLS REDESIGN.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	10.500	0.102	102.9	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
1.001	4.063	0.039	104.2	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
1.002	9.000	0.176	51.1	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit
2.000	19.500	0.189	103.2	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
2.001	7.500	0.073	102.7	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
3.000	7.741	0.262	29.5	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
2.002	5.637	0.055	102.5	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
1.003	5.450	0.903	6.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.23	76.850	0.005	0.0	0.0	0.3	0.76	6.0	0.9
1.001	50.00	5.32	76.748	0.005	0.0	0.0	0.3	0.75	5.9	0.9
1.002	50.00	5.46	76.709	0.010	0.0	0.0	0.5	1.08	8.5	1.9
2.000	50.00	5.43	76.850	0.005	0.0	0.0	0.3	0.76	5.9	0.9
2.001	50.00	5.59	76.661	0.005	0.0	0.0	0.3	0.76	6.0	0.9
3.000	50.00	5.09	76.850	0.005	0.0	0.0	0.3	1.42	11.2	0.9
2.002	50.00	5.72	76.588	0.010	0.0	0.0	0.5	0.76	6.0	1.9
1.003	50.00	5.74	76.483	0.020	0.0	0.0	1.1	4.13	73.0	3.8

Network Design Table for COLDWELLS REDESIGN.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
4.000	20.351	0.198	102.8	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit
4.001	10.789	0.222	48.6	0.028	0.00	0.0	0.600	o	150	Pipe/Conduit
1.004	10.757	0.129	83.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
5.000	11.250	1.125	10.0	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
6.000	19.500	0.189	103.2	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
6.001	8.300	0.081	102.5	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
6.002	7.650	0.074	103.4	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit
6.003	8.900	0.086	103.5	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit
5.001	7.391	0.224	33.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
1.005	19.479	0.544	35.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
7.000	19.500	0.189	103.2	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit
7.001	9.778	0.095	102.9	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit
7.002	7.527	0.073	103.1	0.024	0.00	0.0	0.600	o	150	Pipe/Conduit
7.003	7.401	0.072	102.8	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit
7.004	7.776	0.089	87.4	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.34	76.000	0.010	0.0	0.0	0.5	0.99	17.5	1.9
4.001	50.00	5.47	75.802	0.038	0.0	0.0	2.1	1.45	25.6	7.2
1.004	50.00	5.90	75.580	0.058	0.0	0.0	3.1	1.10	19.5	11.0
5.000	50.00	5.08	76.850	0.005	0.0	0.0	0.3	2.46	19.3	0.9
6.000	50.00	5.43	77.171	0.005	0.0	0.0	0.3	0.76	5.9	0.9
6.001	50.00	5.61	76.982	0.005	0.0	0.0	0.3	0.76	6.0	0.9
6.002	50.00	5.78	76.901	0.010	0.0	0.0	0.5	0.76	5.9	1.9
6.003	50.00	5.98	76.827	0.015	0.0	0.0	0.8	0.76	5.9	2.8
5.001	50.00	6.05	75.675	0.020	0.0	0.0	1.1	1.76	31.1	3.8
1.005	50.00	6.24	75.451	0.078	0.0	0.0	4.2	1.69	29.8	14.8
7.000	50.00	5.43	75.769	0.005	0.0	0.0	0.3	0.76	5.9	0.9
7.001	50.00	5.64	75.580	0.010	0.0	0.0	0.5	0.76	6.0	1.9
7.002	50.00	5.77	75.435	0.034	0.0	0.0	1.8	0.99	17.5	6.4
7.003	50.00	5.90	75.362	0.039	0.0	0.0	2.1	0.99	17.5	7.4
7.004	50.00	6.02	75.290	0.044	0.0	0.0	2.4	1.08	19.0	8.3

Network Design Table for COLDWELLS REDESIGN.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
7.005	3.656	0.294	12.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
8.000	9.767	0.095	102.8	0.010	5.00	0.0	0.600	o	100	Pipe/Conduit
8.001	5.992	0.058	103.3	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
1.006	13.147	1.096	12.0	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit
1.007	9.059	0.432	21.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
1.008	31.454	0.126	250.0	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit
1.009	23.989	0.120	200.0	0.021	0.00	0.0	0.600	o	225	Pipe/Conduit
1.010	11.807	0.059	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.005	50.00	6.04	75.201	0.044	0.0	0.0	2.4	2.87	50.8	8.3
8.000	50.00	5.21	75.110	0.010	0.0	0.0	0.5	0.76	6.0	1.9
8.001	50.00	5.35	75.015	0.010	0.0	0.0	0.5	0.76	5.9	1.9
1.006	50.00	6.31	74.907	0.137	0.0	0.0	7.4	2.92	51.7	26.0
1.007	50.00	6.38	73.811	0.137	0.0	0.0	7.4	2.21	39.0	26.0
1.008	50.00	7.02	73.304	0.171	0.0	0.0	9.3	0.82	32.7	32.4
1.009	50.00	7.45	73.179	0.192	0.0	0.0	10.4	0.92	36.6	36.4
1.010	50.00	7.67	73.059	0.192	0.0	0.0	10.4	0.92	36.6	36.4

Manhole Schedules for COLDWELLS REDESIGN.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	77.850	1.000	Open Manhole	1200	1.000	76.850	100				
2	77.850	1.102	Open Manhole	1200	1.001	76.748	100	1.000	76.748	100	
3	77.850	1.141	Open Manhole	1200	1.002	76.709	100	1.001	76.709	100	
4	77.850	1.000	Open Manhole	1200	2.000	76.850	100				
5	77.850	1.189	Open Manhole	1200	2.001	76.661	100	2.000	76.661	100	
28	77.850	1.000	Open Manhole	1200	3.000	76.850	100				
22	77.850	1.262	Open Manhole	1200	2.002	76.588	100	2.001	76.588	100	
								3.000	76.588	100	
6	78.000	1.517	Open Manhole	1200	1.003	76.483	150	1.002	76.533	100	
								2.002	76.533	100	
7	76.850	0.850	Open Manhole	1200	4.000	76.000	150				
8	76.850	1.048	Open Manhole	1200	4.001	75.802	150	4.000	75.802	150	
10	77.500	1.920	Open Manhole	1200	1.004	75.580	150	1.003	75.580	150	
								4.001	75.580	150	
11	77.850	1.000	Open Manhole	600	5.000	76.850	100				
12	77.850	0.679	Open Manhole	600	6.000	77.171	100				
13	77.850	0.868	Open Manhole	600	6.001	76.982	100	6.000	76.982	100	
14	77.850	0.949	Open Manhole	600	6.002	76.901	100	6.001	76.901	100	
15	77.850	1.023	Open Manhole	600	6.003	76.827	100	6.002	76.827	100	
16	78.000	2.325	Open Manhole	600	5.001	75.675	150	5.000	75.725	100	
								6.003	76.741	100	1016
17	77.669	2.218	Open Manhole	600	1.005	75.451	150	1.004	75.451	150	
								5.001	75.451	150	
9	76.850	1.081	Open Manhole	1200	7.000	75.769	100				
18	76.850	1.270	Open Manhole	600	7.001	75.580	100	7.000	75.580	100	
19	76.850	1.415	Open Manhole	600	7.002	75.435	150	7.001	75.485	100	
20	76.850	1.488	Open Manhole	600	7.003	75.362	150	7.002	75.362	150	
21	76.850	1.560	Open Manhole	600	7.004	75.290	150	7.003	75.290	150	
23	76.850	1.649	Open Manhole	600	7.005	75.201	150	7.004	75.201	150	
31	76.850	1.740	Open Manhole	1200	8.000	75.110	100				
32	76.850	1.835	Open Manhole	1200	8.001	75.015	100	8.000	75.015	100	
24	76.382	1.475	Open Manhole	600	1.006	74.907	150	1.005	74.907	150	
								7.005	74.907	150	
								8.001	74.957	100	
25	75.748	1.937	Open Manhole	600	1.007	73.811	150	1.006	73.811	150	
26	75.564	2.260	Open Manhole	1200	1.008	73.304	225	1.007	73.379	150	
27	74.784	1.605	Open Manhole	1200	1.009	73.179	225	1.008	73.179	225	

Manhole Schedules for COLDWELLS REDESIGN.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
29	74.184	1.125	Open Manhole	1500	1.010	73.059	225	1.009	73.059	225	
30	73.700	0.700	Open Manhole	0		OUTFALL		1.010	73.000	225	

PIPELINE SCHEDULES for COLDWELLS REDESIGN.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	1	77.850	76.850	0.900	Open Manhole	1200
1.001	o	100	2	77.850	76.748	1.002	Open Manhole	1200
1.002	o	100	3	77.850	76.709	1.041	Open Manhole	1200
2.000	o	100	4	77.850	76.850	0.900	Open Manhole	1200
2.001	o	100	5	77.850	76.661	1.089	Open Manhole	1200
3.000	o	100	28	77.850	76.850	0.900	Open Manhole	1200
2.002	o	100	22	77.850	76.588	1.162	Open Manhole	1200
1.003	o	150	6	78.000	76.483	1.367	Open Manhole	1200
4.000	o	150	7	76.850	76.000	0.700	Open Manhole	1200
4.001	o	150	8	76.850	75.802	0.898	Open Manhole	1200
1.004	o	150	10	77.500	75.580	1.770	Open Manhole	1200
5.000	o	100	11	77.850	76.850	0.900	Open Manhole	600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	10.500	102.9	2	77.850	76.748	1.002	Open Manhole	1200
1.001	4.063	104.2	3	77.850	76.709	1.041	Open Manhole	1200
1.002	9.000	51.1	6	78.000	76.533	1.367	Open Manhole	1200
2.000	19.500	103.2	5	77.850	76.661	1.089	Open Manhole	1200
2.001	7.500	102.7	22	77.850	76.588	1.162	Open Manhole	1200
3.000	7.741	29.5	22	77.850	76.588	1.162	Open Manhole	1200
2.002	5.637	102.5	6	78.000	76.533	1.367	Open Manhole	1200
1.003	5.450	6.0	10	77.500	75.580	1.770	Open Manhole	1200
4.000	20.351	102.8	8	76.850	75.802	0.898	Open Manhole	1200
4.001	10.789	48.6	10	77.500	75.580	1.770	Open Manhole	1200
1.004	10.757	83.4	17	77.669	75.451	2.068	Open Manhole	600
5.000	11.250	10.0	16	78.000	75.725	2.175	Open Manhole	600

PIPELINE SCHEDULES for COLDWELLS REDESIGN.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	o	100	12	77.850	77.171	0.579	Open Manhole	600
6.001	o	100	13	77.850	76.982	0.768	Open Manhole	600
6.002	o	100	14	77.850	76.901	0.849	Open Manhole	600
6.003	o	100	15	77.850	76.827	0.923	Open Manhole	600
5.001	o	150	16	78.000	75.675	2.175	Open Manhole	600
1.005	o	150	17	77.669	75.451	2.068	Open Manhole	600
7.000	o	100	9	76.850	75.769	0.981	Open Manhole	1200
7.001	o	100	18	76.850	75.580	1.170	Open Manhole	600
7.002	o	150	19	76.850	75.435	1.265	Open Manhole	600
7.003	o	150	20	76.850	75.362	1.338	Open Manhole	600
7.004	o	150	21	76.850	75.290	1.410	Open Manhole	600
7.005	o	150	23	76.850	75.201	1.499	Open Manhole	600
8.000	o	100	31	76.850	75.110	1.640	Open Manhole	1200
8.001	o	100	32	76.850	75.015	1.735	Open Manhole	1200
1.006	o	150	24	76.382	74.907	1.325	Open Manhole	600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	19.500	103.2	13	77.850	76.982	0.768	Open Manhole	600
6.001	8.300	102.5	14	77.850	76.901	0.849	Open Manhole	600
6.002	7.650	103.4	15	77.850	76.827	0.923	Open Manhole	600
6.003	8.900	103.5	16	78.000	76.741	1.159	Open Manhole	600
5.001	7.391	33.0	17	77.669	75.451	2.068	Open Manhole	600
1.005	19.479	35.8	24	76.382	74.907	1.325	Open Manhole	600
7.000	19.500	103.2	18	76.850	75.580	1.170	Open Manhole	600
7.001	9.778	102.9	19	76.850	75.485	1.265	Open Manhole	600
7.002	7.527	103.1	20	76.850	75.362	1.338	Open Manhole	600
7.003	7.401	102.8	21	76.850	75.290	1.410	Open Manhole	600
7.004	7.776	87.4	23	76.850	75.201	1.499	Open Manhole	600
7.005	3.656	12.4	24	76.382	74.907	1.325	Open Manhole	600
8.000	9.767	102.8	32	76.850	75.015	1.735	Open Manhole	1200
8.001	5.992	103.3	24	76.382	74.957	1.325	Open Manhole	600
1.006	13.147	12.0	25	75.748	73.811	1.787	Open Manhole	600

PIPELINE SCHEDULES for COLDWELLS REDESIGN.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	o	150	25	75.748	73.811	1.787	Open Manhole	600
1.008	o	225	26	75.564	73.304	2.035	Open Manhole	1200
1.009	o	225	27	74.784	73.179	1.380	Open Manhole	1200
1.010	o	225	29	74.184	73.059	0.900	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	9.059	21.0	26	75.564	73.379	2.035	Open Manhole	1200
1.008	31.454	250.0	27	74.784	73.179	1.380	Open Manhole	1200
1.009	23.989	200.0	29	74.184	73.059	0.900	Open Manhole	1500
1.010	11.807	200.0	30	73.700	73.000	0.475	Open Manhole	0

Free Flowing Outfall Details for COLDWELLS REDESIGN.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	30	73.700	73.000	73.030	0	0

Simulation Criteria for COLDWELLS REDESIGN.SWS

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	40.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	15
Ratio R	0.399		

Online Controls for COLDWELLS REDESIGN.SWS

Hydro-Brake® Optimum Manhole: 29, DS/PN: 1.010, Volume (m³): 2.9

Unit Reference	MD-SHE-0098-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	73.059
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0	Kick-Flo®	0.878	3.9
Flush-Flo™	0.431	4.9	Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Storage Structures for COLDWELLS REDESIGN.SWS

Tank or Pond Manhole: 26, DS/PN: 1.008

Invert Level (m) 73.304

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	90.0	1.000	90.0	1.001	0.0

Summary of Results for 15 minute 100 year Winter (COLDWELLS REDESIGN.SWS)

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	76.902	-0.048	0.000	0.52		2.9	OK
1.001	2	76.803	-0.045	0.000	0.58		2.9	OK
1.002	3	76.775	-0.034	0.000	0.75		5.9	OK
2.000	4	76.901	-0.049	0.000	0.50		2.9	OK
2.001	5	76.713	-0.048	0.000	0.54		2.9	OK
3.000	28	76.887	-0.063	0.000	0.29		2.9	OK
2.002	22	76.692	0.004	0.000	1.05		5.6	SURCHARGED
1.003	6	76.527	-0.106	0.000	0.19		11.2	OK
4.000	7	76.538	0.388	0.000	0.33		5.5	SURCHARGED
4.001	8	76.524	0.572	0.000	0.71		16.4	SURCHARGED
1.004	10	76.464	0.734	0.000	1.22		21.3	SURCHARGED
5.000	11	76.877	-0.073	0.000	0.16		2.9	OK
6.000	12	77.222	-0.049	0.000	0.50		2.9	OK
6.001	13	77.122	0.040	0.000	0.57		3.1	SURCHARGED
6.002	14	77.101	0.100	0.000	1.01		5.5	SURCHARGED
6.003	15	77.029	0.102	0.000	1.47		8.1	SURCHARGED
5.001	16	76.325	0.500	0.000	0.37		9.9	SURCHARGED
1.005	17	76.296	0.695	0.000	1.05		29.5	SURCHARGED
7.000	9	76.041	0.172	0.000	0.51		2.9	SURCHARGED
7.001	18	76.023	0.343	0.000	0.89		4.9	SURCHARGED
7.002	19	75.990	0.405	0.000	1.11		16.7	SURCHARGED
7.003	20	75.918	0.406	0.000	1.26		18.9	SURCHARGED
7.004	21	75.846	0.406	0.000	1.28		21.1	SURCHARGED
7.005	23	75.761	0.410	0.000	0.58		19.8	SURCHARGED
8.000	31	75.756	0.546	0.000	0.74		4.1	SURCHARGED
8.001	32	75.718	0.603	0.000	1.32		7.0	SURCHARGED
1.006	24	75.694	0.637	0.000	1.05		49.6	SURCHARGED
1.007	25	74.501	0.540	0.000	1.44		49.5	SURCHARGED
1.008	26	73.783	0.253	0.000	0.48		14.7	SURCHARGED
1.009	27	73.838	0.435	0.000	0.37		12.5	SURCHARGED
1.010	29	73.839	0.555	0.000	0.16		4.9	SURCHARGED