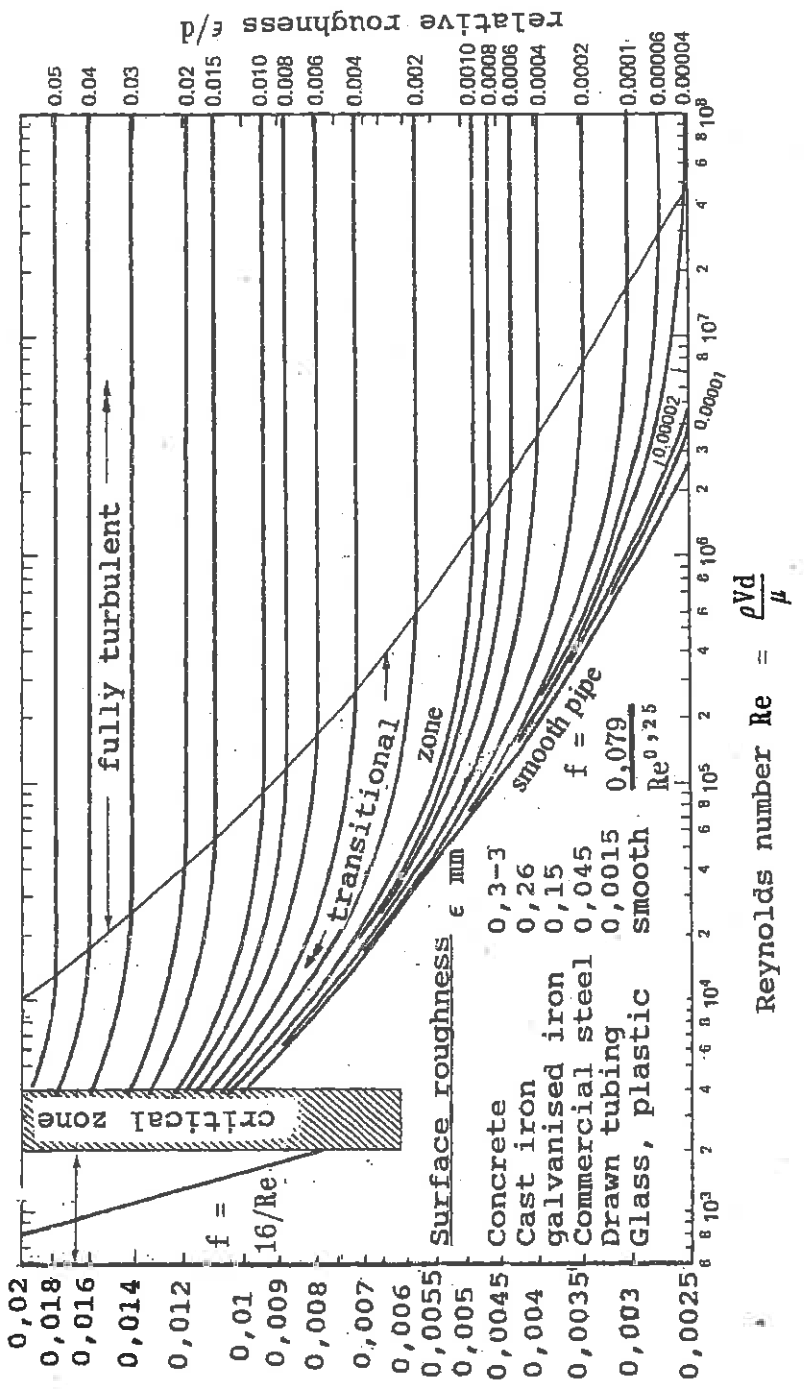

Figure 7.3 Moody-diagram

TABLE 2.5
DOMESTIC WATER REQUIREMENTS

Area and category	General requirement (ℓ/stand.day)	*Per capita* requirement (ℓ/*capita*.day)	
Urban areas		minimum	maximum
Upper	2 000	200	300
Middle	1 000	100	200
Lower	500	50	100
Rural areas			
drinking, cooking & personal hygiene		15	50
local (drinking water for an adult)		3	10
communal taps (400 m)		20	40
stand pipes (200 m)		30	50
private connections		100	
full services		150	

TABLE 2.6
INDUSTRIAL WATER INTAKE PER UNIT OF PRODUCT PRODUCED

Process	Water intake per unit
Abattoirs	1,4 to 2,0 m^3/ large cattle unit
Breweries	5 to 8,8 ℓ/ℓ
Dairy products:	
Butter	1,3 to 1,5 m^3/t
Cheese	20 to 23 m^3/t
Condensed milk	3,5 to 4,4 m^3/t
Fruit juices	1,7 to 2,7 ℓ/ℓ
Ice cream	1,9 to 2,5 ℓ/ℓ
Milk powder	8,7 to 11,8 m^3/t
Pasteurised milk	0,8 to 3,0 ℓ/ℓ
Laundry	8 to 20 m^3/t
Metal finishing	0,03 to 1,25 m^3/m^2
Paper:	
Kraft paper and corrugation medium	10 to 20 m^3/t
Newsprint, magazine paper, folding box boarded	20 to 30 m^3/t
Food board	20 to 40 m^3/t
Wood-free printing paper	30 to 50 m^3/t
Poultry	15 to 30 ℓ/bird
Soft drinks	2,7 ℓ/ℓ
Sorghum and malt	2,5 ℓ/ℓ
Steel *	4 to 200 m^3/t
Sugar	30 to 100 m^3/t
Textiles:	
Cotton (wet processing)	9 to 53 ℓ/kg
Wool dyeing	115 to 152 ℓ/kg
Tanning	339 to 432 ℓ/hide
Thermal power stations *	2,5 to 8,7 ℓ/kWh
Wine-making	0,7 to 3,8 m^3/t grapes
Distillation	1,8 to 6,2 ℓ/ℓ absolute alcohol

* (Funke and Van Vuuren, 1979)
In the supply area of Rand Water, industrial consumption, including TRANSNET and mining, amounted to about 30% of the total flow for the 20-year period to 1991.

Table 2.7: Non-Domestic Water Requirements (DNH, 1994 and IRC, 1981)	
Category	**Typical water use**
Schools	
• day	15 - 20 ℓ/pupil per day
• boarding	90 - 140 ℓ/pupil per day
Clinics/hospitals (with laundry)	220 - 300 ℓ/bed per day
Community halls/restaurants	65 - 90 ℓ/seat per day
Mosques/churches	25 - 40 ℓ/visitor per day
Cinemas	10 - 15 ℓ/seat per day
Offices	25 - 40 ℓ/person per day
Railway and bus stations	15 - 20 ℓ/user per day
Agriculture	
• cattle	25 - 35 ℓ/head per day
• horses and mules	20 - 25 ℓ/head per day
• sheep	15 - 25 ℓ/head per day
• pigs	10 - 15 ℓ/head per day
• chickens	15 - 25 ℓ/100 per day

Table 2.8: Water Demand

Category	Type of development	Unit	Annual average water demand(ℓ/d)
1	Dwelling houses (residential Zone 1)	Erf area for dwelling house	See Figure 2.6 for erven not exceeding 2 000 m^2. For erven 2 000 m^2 base demand on local conditions
2	Low-rise multiple dwelling unit buildings (Residential Zones II & III)	Dwelling	Upper limit 1 000[(a)] Lower limit 600 [(a)]
3	High-rise multiple dwelling unit buildings (Residential Zone IV)	Dwelling	Upper limit 700[(a)] Lower limit 450[(a)]
4	Offices and shops	100 m^2 of gross floor area[(b)]	400
5	Government and Municipal	100 m^2 of gross floor area[(b)]	400
6	Clinic	100 m^2 of gross floor area[(b)]	500
7	Church	Erf	2 000
8	Hostels	Occupants	150
9	Developed parks	Hectare of erf area	≤2 ha 15 kℓ[(c) (d)] >2 ha ≤ 10 ha 12,5 kℓ[(c) (d)] >10 ha 10 kℓ[(c) (d)]
10	Day schools	Hectare of erf area	As for developed parks[(d)]
11	Boarding schools	Hectare of erf area plus boarders	As for developed parks plus 150 ℓ/boarder
12	Sportsground	Hectare of erf area	As for developed parks
13	Creche	Hectare of erf area	As for developed parks plus 75 ℓ/person
14	Public open spaces		Nil

(a) Water demand includes garden watering of all common areas outside the limits of the buildings.
(b) Gross floor area obtained using applicable Floor Space Ratio from the Town planning scheme.
(c) Demand for developed parks to be considered as drawn over 6 hours on any particular day in order to obtain the peak demand.
(d) Where the designer anticipates the development of parks and sportsgrounds to be of a high standard, e.g. 25 mm of water applied per week, the annual average water demand should be taken as: 2 ha 50kℓ[(c)]; >2 ha 40kℓ[(c)]; >10 ha 30kℓ[(c)]

DUROFLO PVC-U Pressure Pipe

Duroflo™ unplasticised PVC (PVC-U) pressure pipe is a tried and tested system demonstrating a long track record in the water reticulation sector. Duroflo pressure pipes are manufactured to the SANS 966 Part 1 specification, incorporating the traditional design stresses of 10 and 12.5 MPa. The product is ideally suited to applications in both pumping and gravity designs.

Product Range

- Pressure Classes — 4, 6, 9, 12, 16 and 20 Bar.
- Working Pressures — 400, 600, 900, 1 200, 1 600 and 2 000 kPa.
- Length — Supplied in standard 6m lengths.
- Outside Diameters — Constant for all classes of a given size.
- Pipe Ends / Joints — Spigot and socket pipe with integral socket and locked-in rubber ring seal.

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966 - Part 1

Dimensions

Minimum wall thickness and mass per 6-metre length for each size and class.
(Wall thickness = mm / Mass = kg)

Outside Dia.mm	Class 4		Class 6		Class 9		Class 12		Class 16		Class 20	
	mm	kg	mm	kg	mm	kg	mm	kg	mm	kg	mm	kg
16	-	-	-	-	-	-	-	-	1.5	0.62	-	-
20	-	-	-	-	-	-	-	-	1.5	0.79	-	-
25	-	-	-	-	-	-	1.5	1.01	1.9	1.25	-	-
32	-	-	-	-	1.5	1.31	1.8	1.55	2.4	2.03	-	-
40	-	-	1.5	1.65	1.8	1.96	2.3	2.47	3.0	3.16	-	-
50	1.5	2.08	1.8	2.48	2.2	3.00	2.8	3.77	3.7	4.88	-	-
63	1.5	2.63	1.9	3.31	2.7	4.64	3.6	6.09	4.7	7.80	-	-
75	1.5	3.15	2.2	4.57	3.2	6.56	4.3	8.67	5.6	11.07	-	-
90	1.8	4.53	2.7	6.73	3.9	9.58	5.1	12.34	6.7	15.89	-	-
110	2.2	6.77	2.6	8.14	3.9	12.11	5.1	15.67	6.7	20.29	8.2	24.48
125	2.5	8.91	3.0	10.66	4.4	15.53	5.8	20.25	7.6	26.15	9.3	31.55
140	2.8	11.19	3.3	13.19	4.9	19.37	6.5	25.41	8.5	32.75	10.4	39.51
160	3.2	14.64	3.8	17.36	5.6	25.32	7.4	33.10	9.7	42.76	11.9	51.73
200	3.9	22.40	4.7	26.92	7.0	39.68	9.2	51.62	12.1	66.92	14.9	81.24
250	4.9	35.33	5.9	42.46	8.7	62.68	11.5	81.12	15.1	105.03	18.6	127.58
315	6.2	56.44	7.4	67.28	11.0	99.04	14.5	129.29	19.0	167.12	-	-
355	7.0	72.19	8.4	86.55	12.4	126.57	16.3	164.83	21.4	213.49	-	-
400	7.9	90.90	9.4	109.40	14.0	161.41	18.4	210.21	24.1	276.6	-	-
450	8.9	121.4	10.6	139.39	15.7	204.60	20.7	271.3	27.1	349.4	-	-
500	9.8	148.0	11.8	172.59	17.4	252.34	22.9	333.4	-	-	-	-
560	11.0	182	13.2	217	19.5	318	-	-	-	-	-	-
630	12.5	232	14.8	274	21.9	401	-	-	-	-	-	-

Note:

1. The wall thicknesses for pipe diameters 90mm and below, including the entire class 4 pressure range, are based on a design stress, σ_t of 10MPa and an overall service (design) coefficient (or safety factor) of C = 2.5.
2. Wall thicknesses for pipe diameters from 110mm are based on a design stress, σ_s of 12.5MPa and an overall service (design) coefficient (or safety factor) of C=2.0.