

**TYPICAL FOULING FACTORS**

Cooling Water	Fouling Factors in [m <sup>2</sup> K/W]				
Conditions	Cooling water < 50°C		Cooling water > 50°C		
K	Cooled fluid < 120°C		Cooled fluid > 120°C		
Water velocity	v < 1 m/s	v > 1 m/s	v < 1 m/s	v > 1 m/s	
Type of water					
Sea	0,00009	0,00009	0,00018	0,00018	
Brackish	0,00035	0,00018	0,00053	0,00035	
Cooling tower with inhibitor	0,00018	0,00018	0,00035	0,00035	
Cooling tower without inhibitor	0,00053	0,00053	0,00088	0,00070	
City grid	0,00018	0,00018	0,00035	0,00035	
River minimum	0,00018	0,00018	0,00035	0,00035	
River average	0,00053	0,00035	0,00070	0,00035	
Engine jacket	0,00018	0,00018	0,00018	0,00018	
Deminerlized or distilled	0,00009	0,00009	0,00009	0,00009	
Treated boiler feedwater	0,00018	0,00009	0,00018	0,00018	
Boiler blowdown	0,00035	0,00035	0,00035	0,00035	
<b>SEVERAL FLUIDS</b>					
Fouling Factors in [m <sup>2</sup> K/W]					
Group	Fluid	Fouling Factor			
Oil	Gasoil	0,00009			
	Transformer	0,00018			
	Lubrication	0,00018			
	Heat transfer oil	0,00018			
	Hydraulic	0,00018			
Gas and Vapour	Hydrogen	0,00176			
	Engine exhaust	0,00176			
	Steam	0,00009			
	Steam with oiltraces	0,00018			
	Cooling fluid vapours with oil traces	0,00035			
	Organic solvent vapours	0,00018			
	Compressed air	0,00035			
	Natural gas	0,00018			
	Stable top products	0,00018			
Liquid	Cooling fluid	0,00018			
	Organic heat transfer fluids	0,00018			
	Salts	0,00009			
	LPG, LNG	0,00018			
	MEA and DEA (Amines) solutions	0,00035			
	DEG and TEG (Glycols) solutions	0,00035			
	Stable side products	0,00018			
	Stable bottom products	0,00018			
	Caustics	0,00035			
	Vgetables oils	0,00053			
<b>REFINERY FLUIDS</b>					
Fouling Factors in [m <sup>2</sup> K/W]					
Crude – wet (bearing salty water)	Temperature	0 – 95°C	95 – 160°C	160 – 260°C	> 95 °C
	Velocity				
	< 0,6 m/s	0,00053	0,00088	0,00105	0,00123
	0,6 m/s – 1,2 m/s	0,00035	0,00070	0,00088	0,00106
	> 1,2 m/s	0,00035	0,00070	0,00070	0,00088
Crude – dry	Temperature	0 – 95°C	95 – 160°C	160 – 260°C	> 95 °C
	Velocity				
	< 0,6 m/s	0,00053	0,00053	0,00070	0,00088
	0,6 m/s – 1,2 m/s	0,00035	0,00035	0,00053	0,00070
	> 1,2 m/s	0,00035	0,00035	0,00035	0,00053
Products	Gasoline	0,00018			
	Naphtha and light distillates	0,00018			
	Kerosene	0,00018			
	Light gas oil	0,00035			
	Heavy gas oil	0,00053			
	Heavy fuel oil	0,00088			
	Asphalt and residuum	0,00176			
Cracking and coking units streams	Overhead vapors	0,00035			
	Light cycle oil	0,00035			
	Heavy cycle oil	0,00053			
	Light coker gas oil	0,00053			
	Heavy coker gas oil	0,00070			
	Bottom slurry(> 1,5 m/s)	0,00053			
	Bottom liquid products	0,00035			
Catalytic reforming, hydrocracking, hydrosulfurization (HDS)	Reformer charge	0,00035			
	Reformer effluent	0,00018			
	Hydrocracker charge and effluent	0,00035			
	Recycle gas	0,00018			
	HDS charge and effluent	0,00035			
	Overhead vapors	0,00018			
	Liquid product > 50 API	0,00018			
	Liquid product 30 to 50 API	0,00035			
Light ends processing streams	Overhead vapors and gases	0,00018			
	Liquid products	0,00018			
	Absorption oils	0,00035			
	Alkylation trace acid streams	0,00053			
	Reboiler streams	0,00053			
	Lube oil processing streams	0,00053			
	Feed stock	0,00035			
	Solvent feed mix	0,00035			
	Solvent feed mix	0,00018			
	Extract	0,00035			
	Raffinate	0,00018			
	Asphalt	0,00088			
	Wax slurries	0,00053			
	Redined lube oil	0,00018			