No.	Name	Description	Main input Data	Main Output Data
1	AIRCOOLER	Air cooler preliminary sizing	cooling duty, process in/out temperature, inlet air temperature	No of fans, Air cooler Dimension, bare area, no of rows, Fan Diameter, fan power
2	BLOW DOWN FACILITATOR	preparing input data for hysys depressuring tool to match model specifications with actual system	vessel/pipe dimensions, liquid level, wall thickness for actual system	hysys model input data (vessel diameter and total volume, liquid volume, metal density)
3	BUFFER VESSEL	buffer vessel sizing	consumption flow rate, initial and final pressure, holding time	buffer vessel dimensions
4	BURN PIT	horizontal flare sizing	flow rate, heat of combustion, Mach No.	Tip diameter, dimension of burn pit area
5	COMPRESSIBLE FLOW	calculation of established flow between high and low pressure gas volumes	upstream & downstream pressure, pipe length & diameter, fitting quantity, gas MW and specific heat ratio	flow regime (critical/subcritical), established gas flow rate
6	COMPRESSOR	compressor calculation	flow rate, suction temperature, suction & discharge pressure, Polytrophic efficiency	discharge temperature, motor power
7	CONDENSATE POT	sizing of steam condensate pot for vertical and horizontal reboilers	condensate flow and density, reboiler orientation and dimension, tube bundle pressure drop, dimension of connecting line	condensate pot diameter and height, liquid levels
8	CONTROL VALVE HYDRAULIC	control valve hydraulic calculation for liquid and gas service	control valve suction and discharge hydraulic specification including pipe dimension, fittings, location (pump discharge, others)	suction and discharge pressure at minimum, normal and maximum flow
9	CONTROL VALVE SIZING	control valve sizing for gas, liquid and steam as well as two phase flow	fluid flow rate and physical properties, control valve pressure drop	Control Valve CV
10	CONTROL VALVE WO	relief rate calculation due to control valve wide opening (liquid relief and gas break through)	fluid flow rate and physical properties, control valve pressure drop at relieving condition, Rated Cv	relief rate
11	CV SELECTOR	Cv selection for all ball, gate, needle, butterfly and regulator control valve	type of valve, CV at three opening%	valve size, valve CV at 100% opening (Rated CV), valve characteristics
12	DEPRESSURING	depressuring flow rate calculation and valve sizing	system volume, initial pressure, depressuring requirements	peak flow rate, valve CV
13	DRAINING TIME	calculation of required time for draining an specified volume	differential pressure, initial & final liquid level, vessel diameter, drain line length & diameter, fluid properties	drain flow rate by time, total draining time
14	ECOPIPE	pump discharge , compressor suction and discharge line sizing based on economic factors	type of driver, fuel & electrical cost, material cost, labor cost, hydraulic parameter (flow, pressure, physical properties)	pump suction line, compressor suction line, compressor discharge line
15	EQUIVALENT LENGTH	equivalent length calculation (more than 60 fittings are available)	pipe size, pipe length, no of fittings	total K value, equivalent length
16	EVAPORATION POND	sizing of evaporation pond	inlet water flow, precipitation rate, evaporation rate, TSS and TDS	depth, length and width of pond
17	EXPANSION VESSEL	sizing of expansion vessel for heating media cycle	system volume, minimum and maximum density	vessel diameter and length, level setting
18	FAN	Fan sizing and Rating	flow rate, differential pressure, suction temperature, motor RPM, Motor to fan pulley ratio	Motor power

No.	Name	Description	Main input Data	Main Output Data
19	FILTER SEPARATOR	vertical and horizontal filter separator sizing	gas and liquid flow, gas and liquid density, cartridge size, hold up time	size of filter separator, no of cartridge
20	FIRE	relief rate calculation in fire case for wetted/unwetted case, vertical/horizontal, different head caps	vessel dimension, liquid level, TL elevation, liquid latent heat (W), vessel configuration	Exposed area to fire, relief rate
21	FLARE KOD	Flare Knock Out Drum	flow specification, hold up requirements, No of inlet nozzle, liquid droplet	vessel size, nozzle size
22	FALRE PURGE	Calculation of flare purge requirement during different conditions with or without purge reduction seal	Purge gas composition and condition, Flare system size, H2S concentration, Flared gas heat of combustion	Flare purge requirement for flash back protection, temperature purge, (H2S) sweep purge, start up and assist gas
23	FLARE STACK 1	flare stack sizing based on component toxicity limit	toxic component flow rate and properties, wind velocity and ambient condition, maximum concentration at grade	flare stack height, maximum toxic concentration at grade
24	FLARE STACK 2	flare stack sizing based on flammability limit	combustible component flow rate and properties, wind velocity and ambient condition	flare stack height
25	FLARE STACK 3	flare stack sizing based on radiation limit	gas flow and properties, wind velocity, maximum allowable Mach No. and heat intensity at grade	tip diameter and riser height, heat intensity radiation map
26	FLOW REGIME DETERMINATOR	two phase flow regime for vertical and horizontal line as per shell DEP	vapor and liquid flow rates and densities, line internal diameter	mixed density and velocity, gas and liquid Froude number, flow regime
27	FLOWMETER SELECTION	flow meter type selection	measuring fluid characteristics	appropriate flow meter, available size, limitation, accuracy, design consideration, Cost, advantage, disadvantage
28	GASPRO	gas properties calculation based on GPSA Data book	gas composition, temperature, pressure	density, combustion properties, thermodynamic properties, heat and mass transfer properties
29	HEAT INSULATION 1	insulation thickness calculation for pipe with flowing fluid inside	flow rate and inlet temperature, pipe dimension and thermal specification, insulation specifications, ambient temp.	total heat gain/loss, fluid outlet temperature, insulation thickness
30	HEAT INSULATION 2	insulation thickness calculation for pipe with stagnant fluid inside	initial temperature, pipe dimension and thermal specification, insulation specifications, ambient temperature profile	total heat gain/loss, fluid temperature profile, insulation thickness
31	INTERPOL	data interpolation for simple and complicated tables/figures	table or figure data	table or figure data at requested point
32	LEVEL INSTRUMENT	level instrument type selection	fluid characteristics	appropriate level measurement technology
33	LINE DP 1	line pressure drop calculation for incompressible fluid	flow and physical properties, pipe dimension and no of fitting (more than 50 type of fittings available)	actual pressure drop of pipe for gas and liquid services
34	LINE DP 2	line pressure drop calculation for compressible fluid	flow and physical properties, pipe dimension	pressure drop of pipe
35	LINE SIZING	line sizing for gas (assume incompressible, compressible) and liquid services	flow rate, density , viscosity	DP/100m or 100ft, velocity
36	LINE SIZING TWO PHASE	line sizing for vertical and horizontal two phase flow lines	liquid and vapor flow and properties	Flow Regime, DP/100m or 100ft, velocity

No.	Name	Description	Main input Data	Main Output Data
37	MATERIAL	material selection for Depressuring process based on ASME UCS-66	design pressure, blowdown (temp vs. pressure curve), vessel diameter, Material Yield Stress, corrosion allowance	MDMT, Material of construction
38	NITROGEN PURGING	calculation of nitrogen gas required for vacuum, pressurized and continuous purging	system volume, initial & final pressure, initial oxygen concentration	no of cycles, total nitrogen consumption
39	ORIFICE	orifice sizing for liquid and gas service	fluid flow and properties, pressure at inlet and outlet of RO, bore area	bore area (known flow & DP), Flow rate (known bore area & DP)
40	ORIFICE TWO PHASE	orifice sizing for two phase flow	liquid and vapor flow and properties, pressure at inlet and outlet of RO, bore area	bore area (known flow & DP), Flow rate (known bore area & DP)
41	PACKED TOWER	preliminary sizing of packed column	vapor and liquid flow and specifications, packing type, size and packing factor	column diameter and packed section height
42	PARTICLE FILTER	particle filter sizing for gas and liquid service	gas or liquid flow, size of cartridge, filter inlet nozzle size	filter diameter and length, no of cartridge
43	PLATE PACK	sizing of plate pack for 3 phase separator	light and heavy liquid flow, density and viscosity, light and heavy droplet, plate pack specification	required length for separation (plate pack length)
44	PSV	PSV sizing for liquid, vapor, steam and two phase flow (API old approach)	relief rate, set and back pressure, fluid specification	calculated orifice area, selected orifice area, orifice designation, no of PSVs, inlet and outlet size
45	PSV SUPERCRITICAL	PSV sizing for supercritical fluid in fire and none fire case	vessel dimension, extensive physical properties data	PSV orifice area size
46	PSV TWO PHASE 1	PSV orifice sizing for two phase flow as per ω method	vapor and liquid flow and specifications, PSV set pressure and backpressure, relieving temp	calculated orifice area, selected orifice area, orifice designation, no of PSVs, inlet and outlet size
47	PSV TWO PHASE 2	PSV orifice sizing for two phase flow as per API 520 - APP. D	vapor and liquid flow and specifications, PSV set pressure and backpressure, relieving temp	calculated orifice area, selected orifice area, orifice designation, no of PSVs, inlet and outlet size
48	PSV TWO PHASE 3	PSV orifice sizing for two phase flow (analytical solution to HEM model)	psv flow rate, set pressure, relieving temperature	mass flux, psv size
49	PUMP CALCULATION	determination of pump design parameters	pump design and hydraulic parameter	pump minimum flow, pump efficiency, NPSHR, Acceleration loss
50	PUMP HYDRAULIC	pump hydraulic calculation	pumping flow, fluid properties, suction and discharge hydraulic data,	pump differential pressure, NPSHA, shut off pressure, brake horse power
51	REACTOR DP	calculation of reactor pressure drop during depressuring	depressuring rate, bed length and diameter, catalyst specifications	reactor pressure drop
52	SALT BALANCE	salt balance for single stage, two stage and single stage plus upstream separator configurations	oil and wash water salt content, oil flow rate, mixing efficiency, outlet oil spec (TBP, water%)	Fresh wash water consumption, internal circulation and overall circulation rate
53	SAMPLE COOLER	sizing the cooler required for sampling	Process fluid flow and specifications, cooling fluid specifications, coil material and thermal spec.	coolant flow rate, coil dimensions
54	SCHOEPENTOETER	sizing of Schoepentoeter for vertical and horizontal vessels	vessel diameter, inlet nozzle size	Schoepentoeter dimensions

No.	Name	Description	Main input Data	Main Output Data
55	SETTLE OUT	settle out calculation of compressor loop and any other cases	reactor, vessel, air cooler, pipe, compressor and heater dimension, fluid pressure, temperature and physical properties	settle out pressure
56	SOUND POWER	Sound power level calculation in flare network piping (applicable to pipe larger than 12")	gas flow rate, pipe pressure drop, fluid temp	sound power level (dB), design consideration
57	SRK	SRK equation of state solution for a mixture with more than 450 component	gas composition, temperature, vessel volume and mass of gas	SRK coefficients, gas pressure
58	STEAM CONDENSATE LINE	steam condensate line sizing	Condensate pressure upstream and downstream of valve, condensate flow	flashed condensate weight fraction, steam-condensate mix density, and mixture pressure drop & velocity
59	STRAINER DP	pressure drop calculation for basket strainer	pipe size, flow rate, and physical properties, mesh diameter and length, mesh size	strainer pressure drop at 100% clean and 50% clogged conditions
60	SURGE	surge analysis for liquid pipelines	liquid flow and density, pipeline length and wall thickness, liquid bulk modulus	pipeline period, surge pressure
61	TANK	determining tank size for different types of tank	working volume, tank type, roof type, nozzle size, pump out rate	tank diameter & height, nominal capacity, liquid levels
62	TANK COIL	Preliminary heat loss calculation and steam coil sizing for storage tanks	tank dimension, required & initial fluid temp, min ambient temp.	tank heat loss, steam consumption, coil area, no of circle of coil
63	TANK HEAT LOSS	detailed heat loss calculation for tanks	tank dimension, plate and insulation thickness of shell/bottom/roof, plate and insulation thermal conductivity, liquid/air/soil temperature	heat loss from shell/roof/bottom
64	TANK VENTING 1	normal and emergency venting requirements for storage tanks as per API-2000	tank dimension, filling and emptying rate, liquid normal boiling point, liquid height, liquid latent heat	inbreathing and out breathing flow, fire relief rate
65	TANK VENTING 2	normal venting requirements for storage tanks as per ISO 28300	tank dimension, filling and emptying rate, storage temp., vapor pressure, latitude, insulation specification	inbreathing and out breathing flow
66	THERMAL EXPANSION	final pressure of trapped liquid and relief rate due to liquid thermal expansion are per API-521	Initial pressure and temperature, final temperature, liquid cubical expansion coefficient and isothermal compressibility, line diameter and elasticity, heat transfer rate,	final pressure, relief rate
67	THREE PHASE SEPARATOR	vertical and horizontal three phase separator sizing with different internal configuration including submerged weir,	inlet fluid flow and properties, hold up time, type of separation (gravity or mesh pad), internal configuration	vessel diameter and length, interface alarm and switch as well as other alarm and switch level in vessel
68	TUBE RUPTURE	heat exchanger tube rupture relief rate for single and two phase flow	HP side operating pressure, LP side design pressure, tube diameter and length, fluid physical properties	tube rupture relief rate
69	TWO PHASE SEPARATOR 1	vertical and horizontal two phase separator with or without wire mesh based on GPSA	inlet fluid flow and properties, hold up time, type of separation (gravity or mesh pad)	vessel diameter and length, alarm and switch level in vessel
70	TWO PHASE SEPARATOR 2	Horizontal two phase separator sizing based on DEP	vapor and liquid flow & physical properties, internal type, liquid level setting	vessel dimension, liquid hold up between levels
71	VANE PACK SEPARATOR	inline and two stage vertical vane separator sizing	vapor and liquid flow & physical properties	Vane box dimensions, vessel dimensions
72	WETTED / UNWETTED	determination of whether the vessel is categorized as wetted or unwetted	vessel dimension, liquid hold up inside the vessel, operating temp and pressure, PSV set pressure	vessel category

No.	Name	Description	Main input Data	Main Output Data
73	INCOMPRESSIBLE FLOW	calculation of established flow between high and low pressure liquid volumes	upstream & downstream pressure, pipe length & diameter, fitting quantity	established liquid flow rate
74	STEAM TRAP	calculation of steam trap for steam main and steam traced process line/equipment	main steam/process diameter, temperature, ambient temp, insulation efficiency, tracer length, tracing steam pressure (latent heat), steam load safety factor	overall heat transfer coefficient, total heat loss, steam trap flow rate
75	HEAT TRANSFER COEFFICIENT	Free and forced convection heat transfer coefficient inside and outside of pipe/equipment	system dimension and orientation, Fluid temperature and physical properties (density, viscosity, conductivity, heat capacity), fluid velocity	Heat transfer coefficient for gas and liquid