

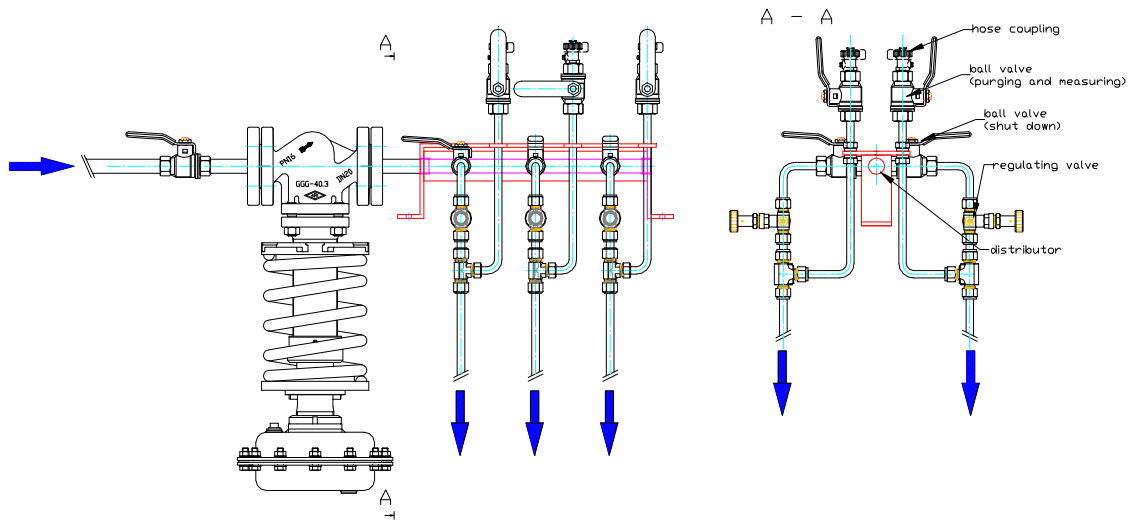
SPES Meeting 17/10/01

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ILK Dresden, Germany**

Topics

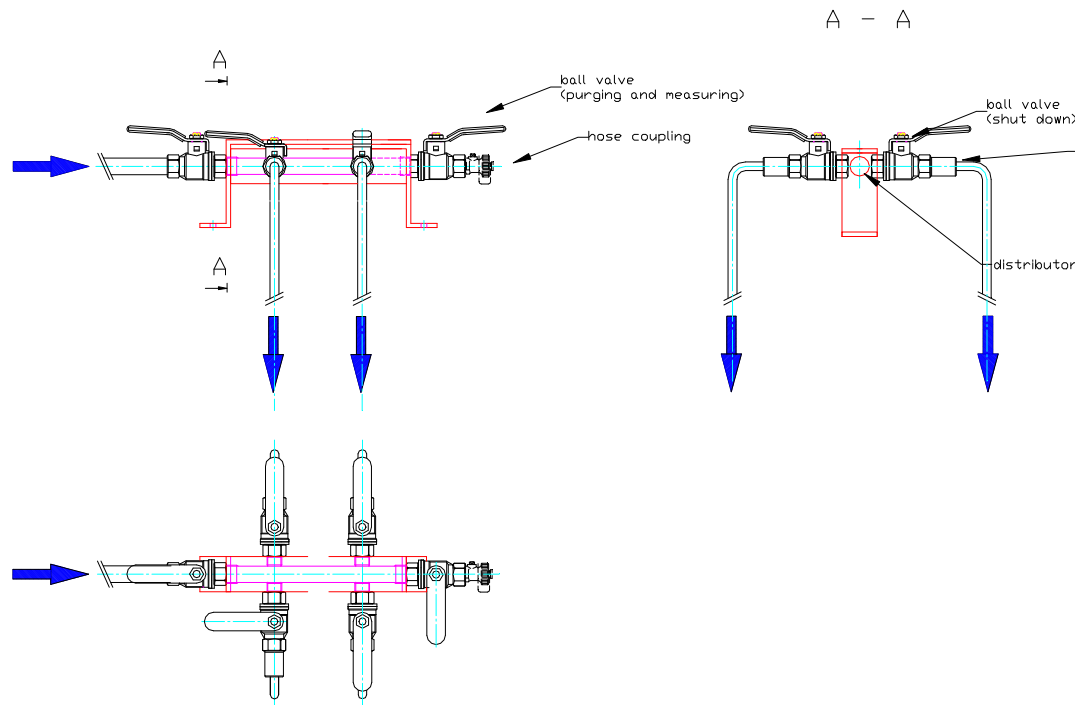
- **Alternative distributor**
- **connection RPC / DT**
- **cost estimate**
- **material clearance for AI and SS**

Present distributor



- can purge each circuit
- can adjust each circuit
- can measure each flow
- able to regulate the flow
- expensive

Alternative distributor



- **Assumption: large safety margin for the cooling power**
- **replacement of Δp -regulator and control valves by flow limiters**
- **no adjustment valve**
- **no flowmeter**
- **no pressure regulator**
- **purging only over the distributor**
- **low cost**

Assumptions for altern. distributor

- the cooling power has a large safety margin
 - the flow precision of $\pm 10\%$ is sufficient
 - in case of purging of one circuit the complete distributor has to be stopped
- ⇒ more detailed discussion on the operation modes is needed

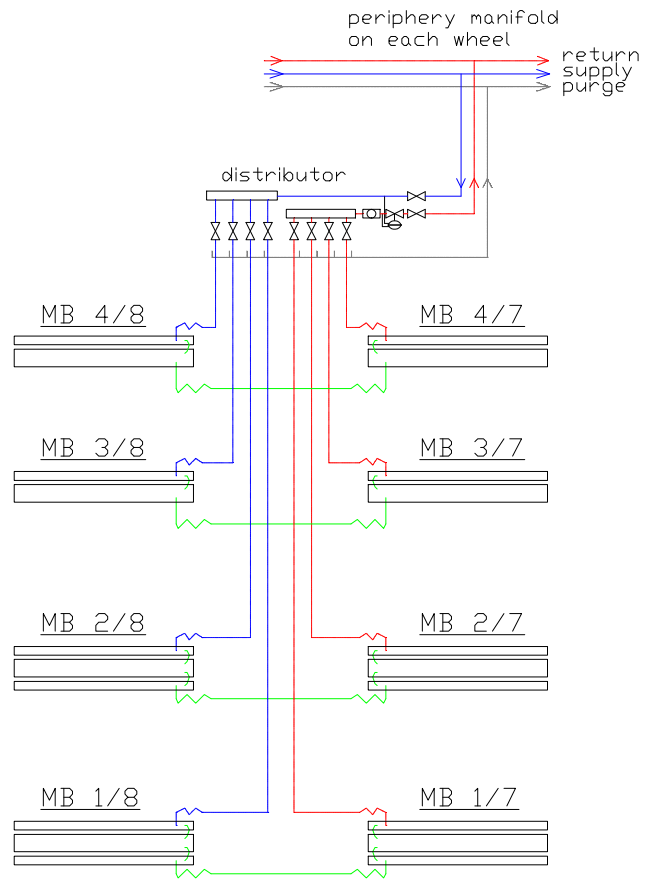
Distributor cost estimate (supply/return)

present distributor			rounded	
qty	dim	item	EP	GP
2	pc	(outlet)	1.000 CHF	2.000 CHF
4	pc	1/4" fine metering valve	100 CHF	400 CHF
4	pc	1/2" flowmeter, 2-8 lpm	240 CHF	960 CHF
1	pc	DN 15, different pressure regulator, 2-5 bar	3.760 CHF	3.760 CHF
8	pc	1/4" purging line (ball valve + pipe + unions)	180 CHF	1.440 CHF
1	general	unions+pipes	950 CHF	950 CHF
				9.510 CHF
			rounded	9.500 CHF
alternative distributor			rounded	
qty	dim	item	EP	GP
2	pc	(outlet)	1.000 CHF	2.000 CHF
4	pc	1/2" flow limiter, 2...4lpm	110 CHF	440 CHF
2	pc	3/4" purging line (ball valve + pipe + unions)	140 CHF	280 CHF
1	general	unions+pipes	460 CHF	460 CHF
				3.180 CHF
			rounded	3.200 CHF

Distributor space requirements

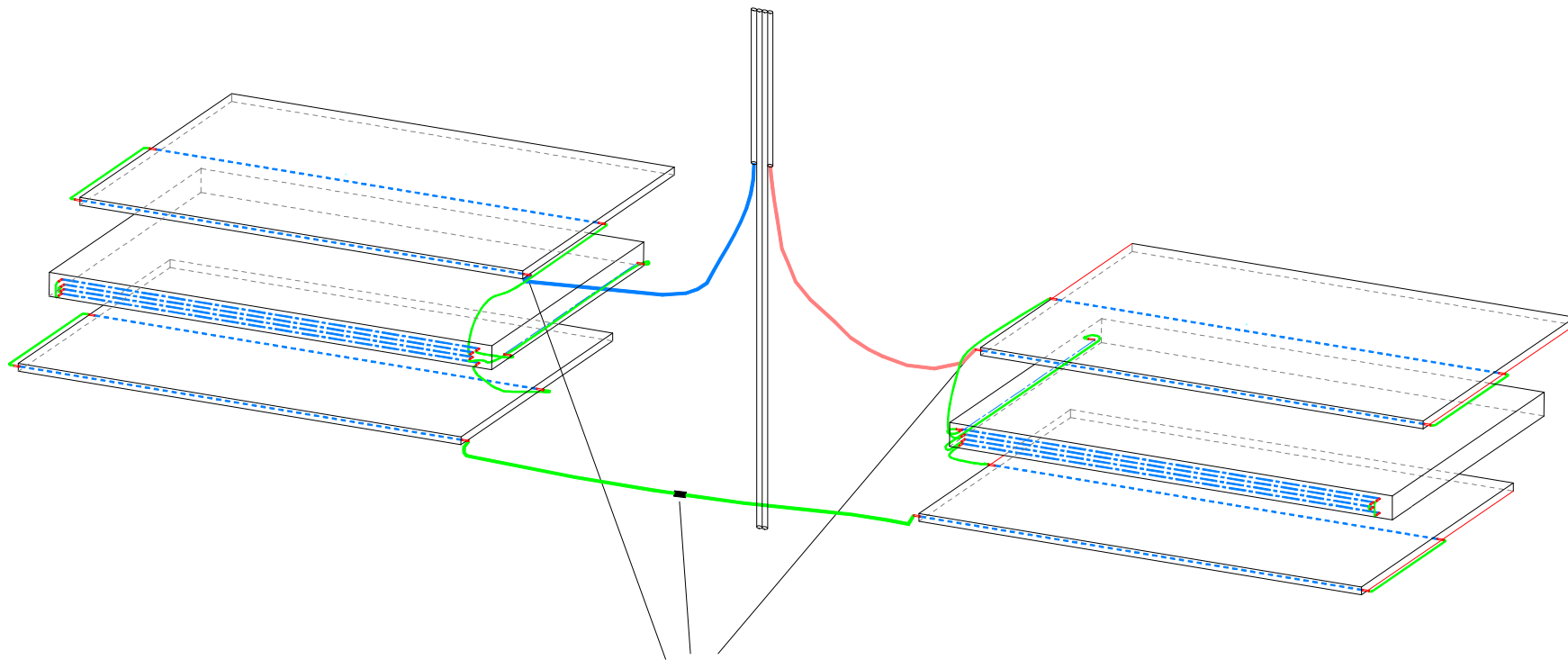
- **for the present distributor:**
 - 800 x 500 x 700 mm³ each
- **for the alternative distributor:**
 - 500 x 500 x 300 mm³ each

Connection of the chambers



- **RPC and DT in series**
- **two chambers in series**
- **one distributor for two sectors**

Connection inside the chambers



quick connectors

Connectors inside the chambers

- **Usage of quick connectors ?**

- **if giving up the usage of quick connectors, 60 kCHF can be saved**
- **emptying of the complete circuit in case of maintenance**

⇒ **more detailed discussion on the operation modes is needed**

Cost estimate overview

costs estimate summary			present		alternative	
qty	dim	item	EP	GP	EP	GP
30	pc	distributor (return)	7.390 CHF	221.700 CHF	1.830 CHF	54.900 CHF
30	pc	distributor (supply)	2.100 CHF	63.000 CHF	1.340 CHF	40.200 CHF
30	pc	cooling circuits (pipes, hoses, unions)	11.400 CHF	342.000 CHF	11.400 CHF	342.000 CHF
1	pc	wheel 0 (pipes)	15.810 CHF	15.810 CHF	15.810 CHF	15.810 CHF
4	pc	wheel (pipes)	11.560 CHF	46.240 CHF	11.560 CHF	46.240 CHF
1	pc	purging sytem (estimate)	15.000 CHF	15.000 CHF	15.000 CHF	15.000 CHF
1	pc	pipng system UXC-CV	32.770 CHF	32.770 CHF	32.770 CHF	32.770 CHF
1	pc	CV zone	75.380 CHF	75.380 CHF	75.380 CHF	75.380 CHF
				811.900 CHF		622.300 CHF
			rounded	811.900 CHF	rounded	622.300 CHF
recommended: quick connectors						
360	pc	3/8"coupling with nipples	170 CHF	61.200 CHF	170 CHF	61.200 CHF
				873.100 CHF		683.500 CHF
			rounded	873.100 CHF	rounded	683.500 CHF

Cost estimate cooling circuits

hoses 2*RPC/DT/PC (one chamber)			rounded	
qty	dim	item	EP	GP
14	pc	nipples	170 CHF	2.380 CHF
2	pc	adapter, hose nipples	140 CHF	280 CHF
				2.660 CHF
			rounded	2.700 CHF
hoses 2*RPC/DT (one chamber)			rounded	
qty	dim	item	EP	GP
10	pc	nipples	170 CHF	1.700 CHF
2	pc	adapter, hose nipples	140 CHF	280 CHF
				1.980 CHF
			rounded	2.000 CHF
cooling circuits (pipes, hoses, unions) without distributor (2 sectors)			rounded	
qty	dim	item	EP	GP
1	pc	1-1 cooling circuit (10*1 tubes, 3/8" hoses)	3.410 CHF	3.410 CHF
1	pc	2-2 cooling circuit (10*1 tubes, 3/8" hoses)	3.260 CHF	3.260 CHF
1	pc	3-3 cooling circuit (10*1 tubes, 3/8" hoses)	2.420 CHF	2.420 CHF
1	pc	4-4 cooling circuit (10*1 tubes, 3/8" hoses)	2.320 CHF	2.320 CHF
				11.410 CHF
			rounded	11.400 CHF

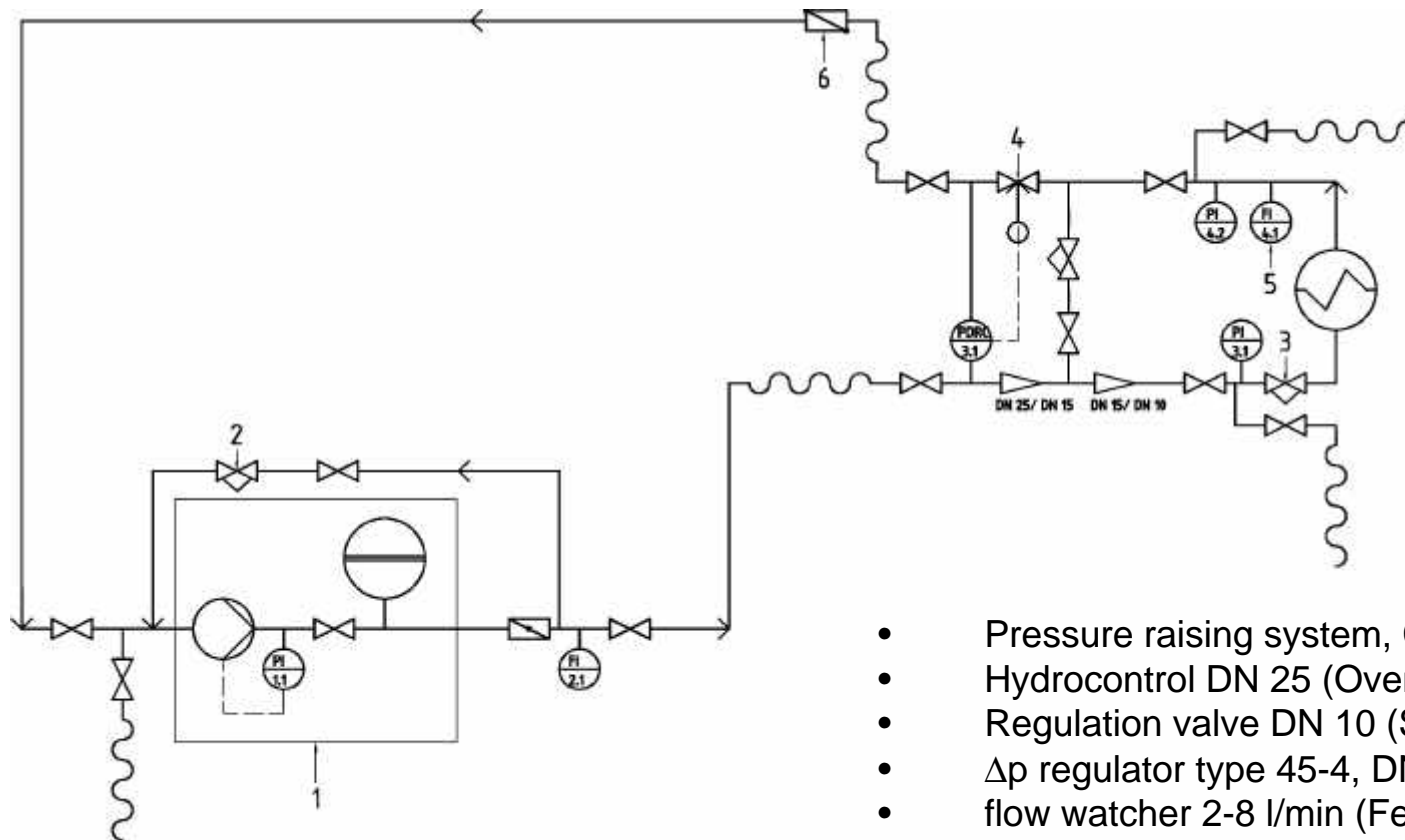
Cost estimate CV-zone

CV-zone			rounded	
qty	dim	item	EP	GP
50	mtr	tubes, including unions, screws ... (mixed price)	150 CHF	7.500 CHF
1	pc	plate heat exchanger (PHE), 70 kW	3.080 CHF	3.080 CHF
1	pc	mounting PHE, regulating -and safety valves	6.160 CHF	6.160 CHF
2	pc	pump (27m ³ /h, 70m)	4.620 CHF	9.240 CHF
2	pc	connection and mounting pump	2.310 CHF	4.620 CHF
1	pc	DDC-Control PHE	6.160 CHF	6.160 CHF
1	pc	DDC-Control pump, emergency, pump change	26.950 CHF	26.950 CHF
1	pc	water- and pressure control unit	11.550 CHF	11.550 CHF
				75.260 CHF
			rounded	75.300 CHF

Material clearance for Al and SS

- **Use of Al and SS possible if:**
 - the conductivity is always $< 20 \mu\text{S}/\text{cm}$
 - sealing of gaps between AL and SS (connectors) to prevent local increasing of conductivity
 - if conductivity $< 20 \mu\text{S}/\text{cm}$ no measurement of O_2 necessary but the purging should be done with N_2
 - possible to use normal flexible tubes

Test stand at ILK



- Pressure raising system, CO-1-MVIS (WILO)
- Hydrocontrol DN 25 (Oventrop)
- Regulation valve DN 10 (Swagelok)
- Δp regulator type 45-4, DN 15 (Samson)
- flow watcher 2-8 l/min (Fessel)
- deaeration valve (Krombach)

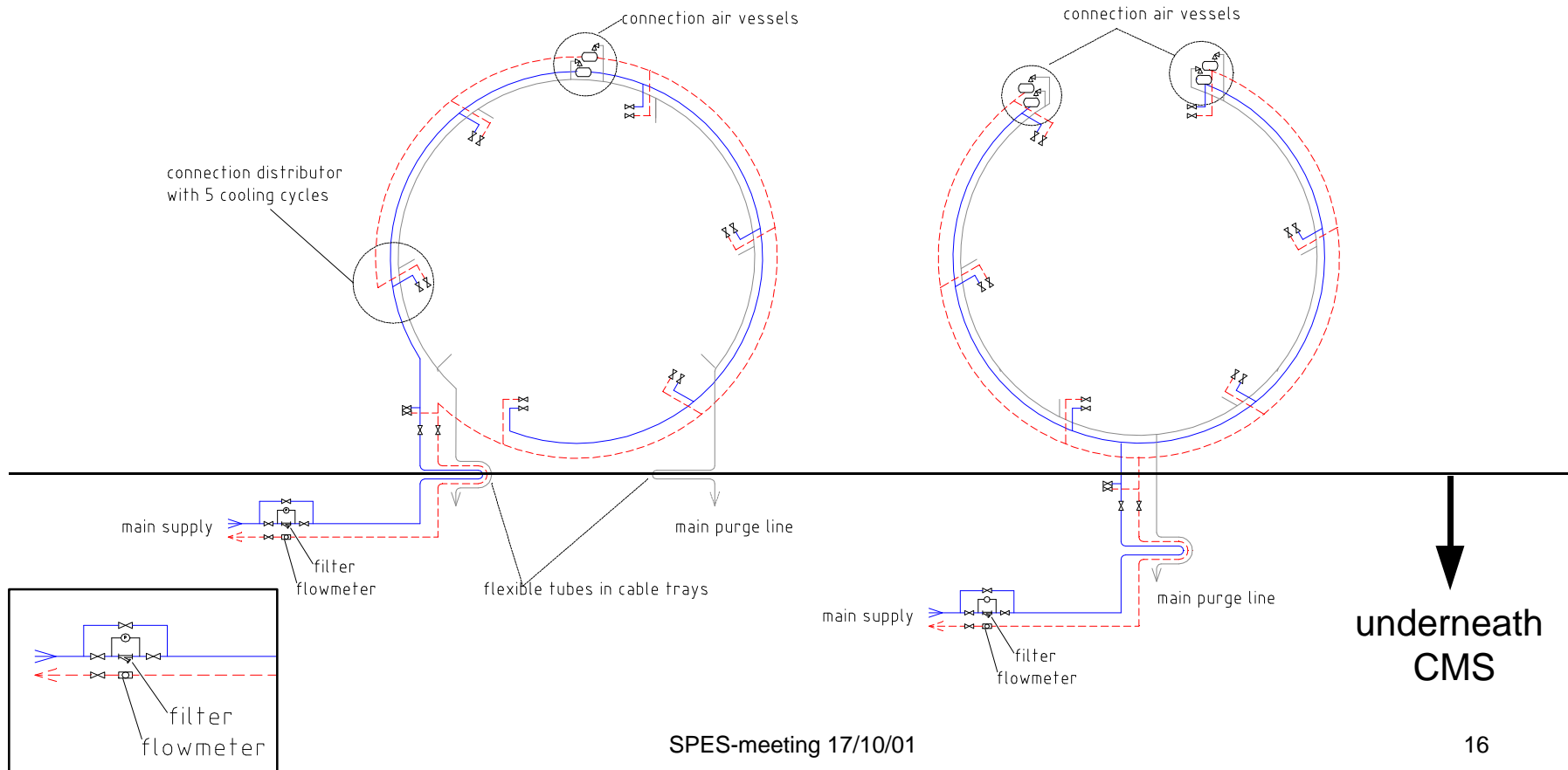
Appendix

- **Circular manifolds of cooling system**
- **flow scheme for cooling circuits**
- **updated scheme for services in USC**

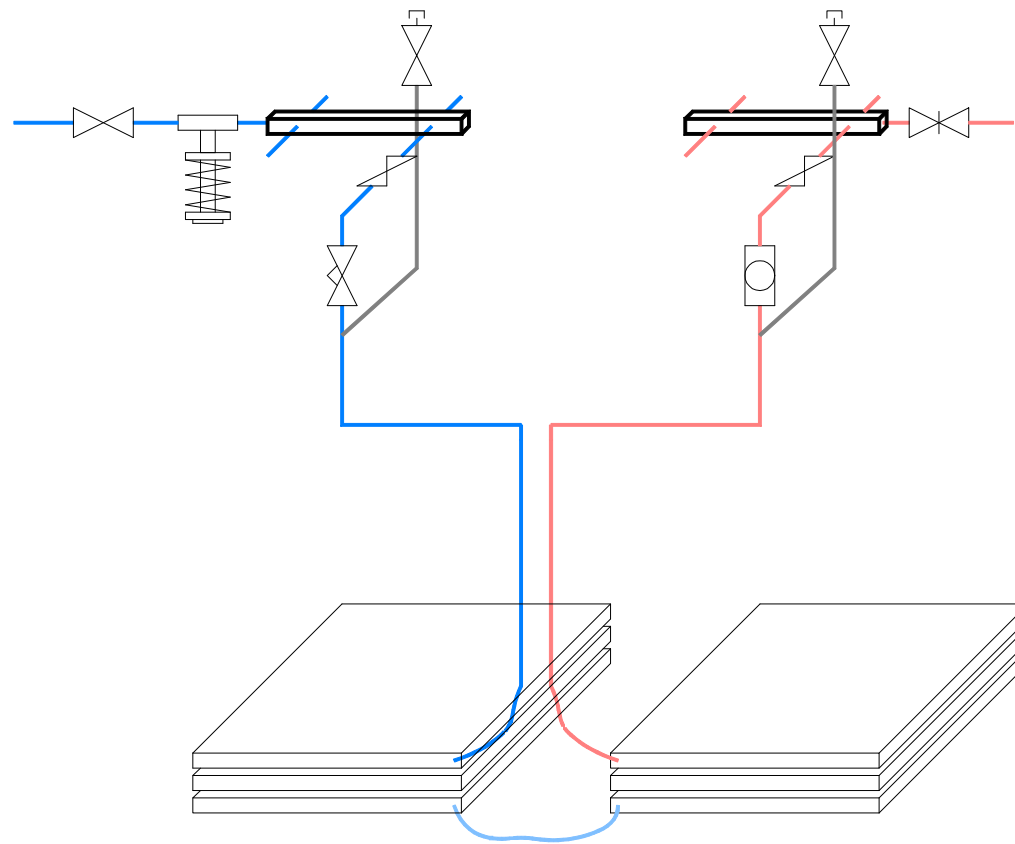
Circular manifolds of cooling system

wheel -2, -1, +1, +2

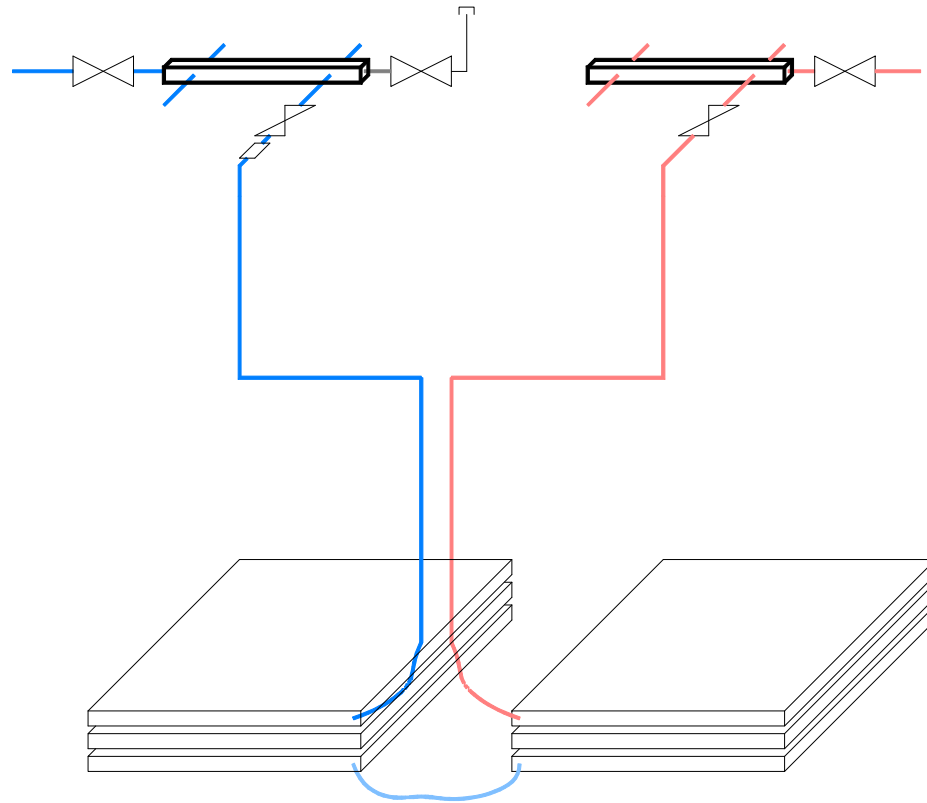
wheel 0



Present distributor and flow scheme



Alternative distributor and flow scheme



Updated scheme for services in USC

USC (CV-Zone)

