AGS-Verfahrenstechnik GmbH
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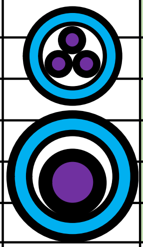
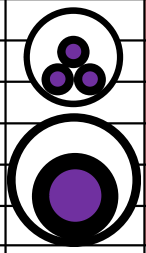
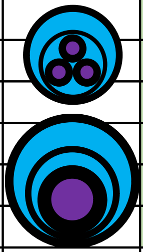
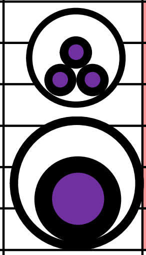
laying and oparation of power cable systems / comparison AGS vs. standard practice

Pos	evaluation criterion	AGS Process	benchm.	evaluation	Standard Process	benchm.	evaluation
1	**cable laying process** (into ductwork)	**buoyancy supported slipping**		**evaluation**	**cable entrainment** (Into ductwork)		**evaluation**
1.1	tension force at cables by laying process		+ + +	none		- - -	high
1.2	risk of mechanical damages for cables by entrainment		+ + +	very low (no tension force at cables)		- -	mechanical damages due to hig tension forces directly at cables
1.3	entrainment into meandering cable ductworks		+ + +	Possible, > facilitates the powerline finding and selection		- -	limitation of curvature radius leads to limitation of power line alternatives
1.4	max. entrainment length of cables (cable joint distances)		+ + +	up to max. transport length on cable drums		- -	limited single cable length due to limited tension force at cable
1.5	Number of necessary cable joints (potential weak points of power lines)		+ + +	small, due to longer cables		-	high, due to limited entrainment length
1.6	risk of damages of the ductwork (protection pipe) by the dragging process		+ + +	small forces in curves to the ductwork wall during entrainment		- -	high forces to the ductwork wall by the drag rope and cables in curves
2	**power transmission, operation,**	water bedded cooling		**evaluation**	air bedded convection		**evaluation**
2.1	risk of long term damages of cable insulation due to thermal (peak) loads		+ +	low due to water bedding and water cable cooling		- - -	very high due to air insulation inside ductwork (protection pipe)
2.2	waste heat transfer into surrounding earth (via bedding material)		+ +	quick, due to high thermal conductivity and specific heat capacity of water		- - -	slow due to low thermal conductivity and specific heat capacity of air
2.3	current transfer capacity of the cable system (peak- and long-term)		+ +	high; due to water bedding and water cable cooling		- - -	limited; due to local and permanent risk of thermal damage of the cabel insulation
2.4	reliability of current transmission		+ +	high, due to permanent cable cooling and peak load resilience		- -	reduced due to higher conductor temperatures and current flow limitation
2.5	operation control effort due to 90°C t-limit (conductor)		+ +	low, dur to high heat buffer capacity and conductivity of water		- - -	high, due to bad heat coductivity of air
2.6	probability of forced limitation of current flow (control interventions, redispatch)		+ + +	low, due to thermal resilience of the water cooled cable system (peak load resistent)		- - -	high, due to bad waste heat dissipation via air into the surrounding earth corpus
3	**economical significance**			**evaluation**			**evaluation**
3.1	efficiency of power transmissen		+ + +	high, due to passive and (optional) forced water based cable cooling		- - -	reduced, (quick warm-up of air bedding and conductor T-max (90°))
3.2	influence on energy generation plants		+ +	no redispatch due to cable temperature limitation		- -	possible redispatch due to cable temperature limitation
3.3	cable design		+ +	avoidance of oversized cunductor cross section		- -	necessity of oversized cunductor cross section
3.4	investment costs for civil works (earth moving)		+ +	option and allowance of compact power line traces with narrow cable distances		-	high, due to wide traces especially in case of HV power lines
3.5	risc of redispatch intervention due to cable damages and temperature limitation		+ + +	very low		- -	high (to avoid thermic damages of cables)
3.6	long term reversibility (replacement of cables into cable protection pipe)		+ + +	possible and long term standard option		- -	limited
3.7	efficient utilisation of thermal losses (AGS+)		+ +	standard option by cooling water recirculation via external heat exchanger		-	limited
3.8	near surface geothermal energy utilisation from power line earth corpus (AGS++)		+ +	standard option by cooling water recirculation via external heat exchanger		- -	not possible