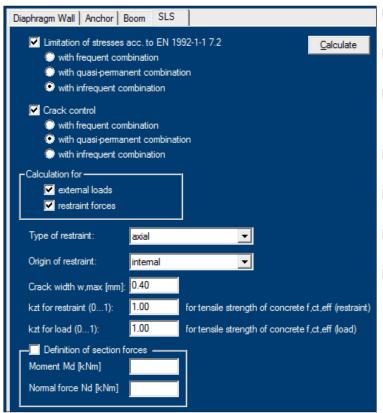
DC-NEWS

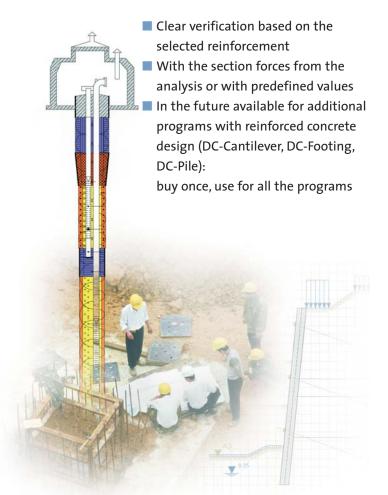
Option DC-Crack for DC-Pit



Serviceability verifications / Crack width limitation



- Limitation of stresses acc. to EN 1992-1-1, 7.2
- Crack control acc. to EN 1992-1-1, 7.3
- Selection from frequent, quasi-permanent or infrequent combination
- Calculation for external load or restrained forces
- Selection of the type and origin of restrained forces
- Definition of the permitted crack width w_{max}
- Selection of the factor kzt for the concrete tensile strengh



	Limit Stat	e (SLS)						
Material parameters	S:								
Concrete C20/25									
cylinder compressi	ve strength		f _{ck} = 20.0	00 N/mm²					
mean tensile stren	gth		$f_{ctm} = 2.2$	20 N/mm²					
Steel									
Strain limit			$f_{yk} = 500.0$	00 N/mm²					
Reinforcement sele	ected A _s [cm²/m]	ø [mm]							
with max. M	-								
exc.s.	10.05	16.0							
supp.s.	10.05	16.0							
with min. M									
exc.s.	10.05	16.0							
supp.s.	10.05	16.0							
Minimal reinforcem Check for Restraint				.3.2 (7.1)					
Maximum permissi			max = 0.40	mm					
effective tensile stre			f _{ct,eff} = 2.20						
chicenve terione out	kc	k	A _{et}	Oο	ø _s *	A _{s.min}	Check	ok	
	[-]	[-]	[cm²/m]	[N/mm²]		[cm²/m]	Onook	OIL	
with max. M	11	11	[CIII /III]	[reminin]	[mm]	[GIII /III]			
exc.s.	1.00	0.74	1000.00	259.39	21.1	8.48	Yes *		
SUDD.S.	1.00	0.74	1000.00	259.39		8.48	Yes *		
with min. M	1.00	0.74	1000.00	209.59	21.1	0.40	165		
exc.s.	1.00	0.74	1000 00	259 39	21.1	8 48	Yes *		
			1000.00		21.1	0.40			
	4.00	0.74	4000.00	050.00	04.4	0.40			
supp.s.	1.00	0.74	1000.00	259.39	21.1	8.48	Yes *		
supp.s.				259.39	21.1	8.48	Yes *		
supp.s. *) Eq. DIN EN 1992	!-1-1/NA 7.5.1	(A _{ct} =		259.39	21.1	8.48	Yes *		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1	!-1-1/NA 7.5.1	(A _{ct} =	A _{cett.})		21.1	8.48	Yes *		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C	-1-1/NA 7.5.1 1992-1-1 7.3 Combination	(A _{ct} =	: A _{c,eff.}) : quasi-perma	inent	21.1	8.48	Yes *		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination lible crack wid	(A _{ct} =	: A _{c,eff.}) : quasi-perma max = 0.40	inent mm	21.1	8.48	Yes *		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi	1-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack wid ength	(A _{ct} = .4 of actions Ith w,	: A _{cett.}) : quasi-perma max = 0.40 f _{ct.eff} = 2.20	inent mm N/mm²				w	Chack
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack wid ength M	.4 of actions tth w,	: A _{c,eff.}) : quasi-perma max = 0.40 f _{ct,eff} = 2.20 A _{c,eff}	inent mm N/mm² Şur	Ole Os	S _{r,max}	ε _{ε,m} -ε _{ε,π}	W _{k,celc}	
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre	1-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack wid ength	(A _{ct} = .4 of actions Ith w,	: A _{cett.}) : quasi-perma max = 0.40 f _{ct.eff} = 2.20	inent mm N/mm²		S _{r,max}	ε _{ε,m} -ε _{ε,π}		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - CM Maximum permis si effective tensile stre with max. M	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack widength M [kNm]	.4 of actions ith w, N [kN]	: A _{c.eff.}) : quasi-perma max = 0.40 f _{c.eff} = 2.20 A _{c.eff} [cm²/m]	inent mm N/mm² 9er [%]	α _ε σ _s [N/m	S _{r,max} m²] [mm]	ς _{s,m} -ς _{c,n} [*/oo]	[mm]	
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre with max. M exc.s.	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack widength M [kNm]	.4 of actions ith w, N [kN]	c quasi-perma max = 0.40 f _{cteff} = 2.20 A _{ceff} [cm ⁹ /m] 666.67	inent mm N/mm² ½m [%]	α _ε σ _s [N/m 6.68 275	S _{r,max}	ς _{s,m} -ς _{c,n} [*/oo]		
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre with max. M exc.s. supp.s.	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack widength M [kNm]	.4 of actions ith w, N [kN]	: A _{c.eff.}) : quasi-perma max = 0.40 f _{c.eff} = 2.20 A _{c.eff} [cm²/m]	inent mm N/mm² ½m [%]	α _ε σ _s [N/m 6.68 275	S _{r,max} m²] [mm]	ς _{s,m} -ς _{c,n} [*/oo]	[mm]	
supp.s. ") Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre with max. M exc.s. supp.s. with min. M	1-1-1/NA 7.5.1 1992-1-1 7.3 Combination ble crack widength M [kNm] 110.61	(A _{et} = .4 of actions th w,	: quasi-perma max = 0.40 f _{cteff} = 2.20 A _{ceff} [cm ⁹ /m] 666.67	nent mm N/mm² 9±r [%] 1.51 6 ation neces:	α _ε σ _s [N/m 5.68 275 sary	S _{r,max} m²] [mm]	ς _{s,m} -ς _{c,n} [*/oo]	[mm]	
supp.s. P) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre with max. M exc.s. supp.s.	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination oble crack widength M [kNm] 110.61 17.66	(A _{ct} = .4 of actions the w, N [kN] -93.82 -20.11	: quasi-perma max = 0.40 f _{ctet} = 2.20 A _{ctet} [cm ² /m] 666.67 *** No verifica	nent mm N/mm² 9== [%] 1.51 € ation neces:	α _ε σ _s [N/m 6.68 275 sary	S _{I,max} m ^a] [mm] 5.69 410.61	ديب-دي [*/00] 1.057	[mm]	
supp.s. ") Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permissi effective tensile stre with max. M exc.s. supp.s. with min. M	1-1-1/NA 7.5.1 1992-1-1 7.3 Combination ble crack widength M [kNm] 110.61	(A _{ct} = .4 of actions the w, N [kN] -93.82 -20.11	: quasi-perma max = 0.40 f _{cteff} = 2.20 A _{ceff} [cm ⁹ /m] 666.67	nent mm N/mm² 9== [%] 1.51 € ation neces:	α _ε σ _s [N/m 6.68 275 sary	S _{I,max} m ^a] [mm] 5.69 410.61	ديب-دي [*/00] 1.057	[mm]	
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permis effective tensile stre with max. M exc.s. supp.s. with min. M exc.s. supp.s.	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination ible crack widength M [kNm] 110.61 110.61 -7.66 -7.66	(A et = .4 of actions the w, N [kN] -93.82 -93.82 -20.11 -20.11	: quasi-perma max = 0.40 f _{ctet} = 2.20 A _{ctet} [cm ² /m] 666.67 *** No verifica	nent mm N/mm² 9== [%] 1.51 € ation neces:	α _ε σ _s [N/m 6.68 275 sary	S _{I,max} m ^a] [mm] 5.69 410.61	ديب-دي [*/00] 1.057	[mm]	
supp.s. *) Eq. DIN EN 1992 Crack Control: EN * Check for Load * C Maximum permis effective tensile stre exc.s. supp.s. with max. M exc.s. supp.s. supp.s. Stress Control: EN	2-1-1/NA 7.5.1 1992-1-1 7.3 Combination in the property of the	(A et = .4 of actions the w, N [kN] -93.82 -93.82 -20.11 -20.11	: quasi-perma max = 0.40 f _{ctet} = 2.20 A _{ctet} [cm ² /m] 666.67 *** No verifica	unent mm N/mm² Ser [%] 1.51 6 attion neces: attion neces:	α _e σ _s [N/m 5.68 275 sary sary oNm):No v	S _{r,max} m*] [mm] i.69 410.61 erification ne	€ _m -€ _{cn} [*/oo] 1.057 cessary	[mm] 0.31	Yes
supp.s. *) Eq. DIN EN 1992 Crack Control: EN * Check for Load * C Maximum permis effective tensile stre with max. M exc.s. supp.s. with min. M exc.s. supp.s. Stress Control: EN	1992-1-1 7.3 combination in 1992-1-1 7.3 combination in 1992-1-1 7.3 combination in 1992-1-1 7.5 combination in 19	(A _{et} = .4 of actions the w, N [kN] -93.82 -93.82 -20.11	c A cest.) c quasi-perma max = 0.40 forer = 2.20 A cest. [cm³/m] 666.67 **** No verifica **** No verifica **** M < M.coock	inent mm N/mm² Per [%] 1.51 6 stion neces: (71.11 k	α _ε σ _ε [N/m [N/m 5.688 275 Sary Sary QNm): No v	s _{r,max} m²] [mm] i.69 410.61 erification ne	ξ _{ωπ} -ξ _{ωπ} [*/oo] 1.057 cessary	[mm] 0.31	Yes
supp.s. *) Eq. DIN EN 1992 Crack Control: EN * Check for Load * C Maximum permis effective tensile stre exc.s. supp.s. with max. M exc.s. supp.s. supp.s. Stress Control: EN	1992-1-1 7.3 Combination: bible crack wide ength M [kNm] 110.61 170.61 -7.66 -7.66 1992-1-1 7.2 Ions: rare M	(A a = .4 of actions the w, N [kN] -93.82 -93.82 -20.11 -20.11	Quasi-perma	inent mm N/mm² See [%] 1.51 € stion neces: stion neces: (71.11 k	α _e σ _e [N/m [N/m 5.68 275 Sary Sary N/m): No v oncrete com : 0.60 ⁺ ξ _e	s _{r,max} m²] [mm] i.69 410.61 erification ne	ξ _{s,m} -ξ _{c,n} [*/oo] 1.057 cessary ess Si σ _s 0	[mm] 0.31 eel tens 80*f _{jk}	Yes
supp.s. ") Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre exc.s. supp.s. with max. M exc.s. supp.s. supp.s. Supp.s. Supp.s.	1992-1-1 7.3 combination in 1992-1-1 7.3 combination in 1992-1-1 7.3 combination in 1992-1-1 7.5 combination in 19	(A _{et} = .4 of actions the w, N [kN] -93.82 -93.82 -20.11	c A cest.) c quasi-perma max = 0.40 forer = 2.20 A cest. [cm³/m] 666.67 **** No verifica **** No verifica **** M < M.coock	inent mm N/mm² See [%] 1.51 € stion neces: stion neces: (71.11 k	α _ε σ _ε [N/m [N/m 5.688 275 Sary Sary QNm): No v	s _{r,max} m²] [mm] i.69 410.61 erification ne	ξ _{ωπ} -ξ _{ωπ} [*/oo] 1.057 cessary	[mm] 0.31 eel tens 80*f _{jk}	Yes
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre with max. M exc.s. supp.s. supp.s. Stress Control: EN Combination of acti	1992-1-1 7.3 Combination in bile crack wide eight M [kNm] 110.61 17.66 1992-1-1 7.2 ions: rare M [kNm]	.4 of actions the will be will	$\begin{array}{l} A_{cst.})\\ \text{quasi-perma}\\ \text{max} = 0.40\\ f_{ctst} = 2.20\\ A_{cst.}\\ f_{ctst} = 2.20\\ A_{cst.}\\ \text{for indicates}\\ \text{for indicates}\\ \text{for indicates}\\ \text{one}\\ \sigma_{till}\\ \text{st.}\\ \text{one}\\ \sigma_{till}\\ \text{st.}\\ \text{st.}\\ \text{[N/mm^2]} \end{array}$	inent mm N/mm² Şer [%] 1.51 € stion neces: stion neces: (71.11 k	o. o	s _{tyme} . m*] [mm] i.69 410.61 erification ne	ξ _{s,m} -ξ _{c,m} [*/oo] 1.057 cessary sss Si σ _s 0 [N/mr	[mm] 0.31 eeel tens .80*f,k m²]	Yes sile stress Check ok
supp.s. ") Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre exc.s. supp.s. with max. M exc.s. supp.s. supp.s. Supp.s. Supp.s.	2-1-1/NA 7.5.1 7.3 Combination ible crack widength M [kNm] 110.61 110.61 -7.66 -7.66 M [kNm] 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61	.4 of actions lth w, N [kN] -93.82 -20.11 2 N [kN] -93.82 -93.82	Quasi-perma max = 0.40 f _{cet} = 2.20 A _{cet} [cm ² /m] 666.67 *** No verifica *** No verifica *** M < M _{crex} [N/mm ²] 3.91 > f _{cet} 3.91 > f _{cet}	Inent mm N/mm² 9er [96] 1.51 € stion neces: ation neces: (71.11 k	α _s σ _s [N/m 5.68 275 sary sary vNm): No v oncrete com : 0.60°f _α [N/mm²]	S _{i,max} m²] [mm] i.69 410.61 erification ne	ξ _{sm} -ξ _{cm} [*/oo] 1.057 cessary ss Si σ _s 0 [N/mr	[mm] 0.31 eeel tens .80*f,k m²]	Yes sile stress Check ok
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre with max. M exc.s. supp.s. Stress Control: EN Combination of acti with max. M exc.s. supp.s.	1992-1-1 7.3 Combination in bile crack wide eight M [kNm] 110.61 17.66 1992-1-1 7.2 ions: rare M [kNm]	.4 of actions the will be will	$\begin{array}{l} A_{cst.})\\ \text{quasi-perma}\\ \text{max} = 0.40\\ f_{ctst} = 2.20\\ A_{cst.}\\ f_{ctst} = 2.20\\ A_{cst.}\\ \text{for indicates}\\ \text{for indicates}\\ \text{for indicates}\\ \text{one}\\ \sigma_{till}\\ \text{st.}\\ \text{one}\\ \sigma_{till}\\ \text{st.}\\ \text{st.}\\ \text{[N/mm^2]} \end{array}$	Inent mm N/mm² 9er [96] 1.51 € stion neces: ation neces: (71.11 k	α _s σ _s [N/m 5.68 275 sary sary vNm): No v oncrete com : 0.60°f _α [N/mm²]	s _{tyme} . m*] [mm] i.69 410.61 erification ne	ξ _{sm} -ξ _{cm} [*/oo] 1.057 cessary ss Si σ _s 0 [N/mr	[mm] 0.31 eeel tens .80*f,k m²]	Yes sile stress Check ok
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre with max. M exc.s. supp.s. Stress Control: EN Combination of acti with max. M exc.s. supp.s.	2-1-1/NA 7.5.1 7.3 Combination ible crack widength M [kNm] 110.61 110.61 -7.66 -7.66 M [kNm] 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61	.4 of actions lth w, N [kN] -93.82 -20.11 2 N [kN] -93.82 -93.82	Quasi-perma max = 0.40 f _{cet} = 2.20 A _{cet} [cm ² /m] 666.67 *** No verifica *** No verifica *** M < M _{crex} [N/mm ²] 3.91 > f _{cet} 3.91 > f _{cet}	Inent mm N/mm² 9er [96] 1.51 € stion neces: ation neces: (71.11 k	α _s σ _s [N/m 5.68 275 sary sary vNm): No v oncrete com : 0.60°f _α [N/mm²]	S _{i,max} m²] [mm] i.69 410.61 erification ne	ξ _{sm} -ξ _{cm} [*/oo] 1.057 cessary ss Si σ _s 0 [N/mr	[mm] 0.31 eeel tens .80*f,k m²]	Yes sile stress Check ok
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre with max. M exc.s. supp.s. with min. M exc.s. supp.s. Stress Control: EN Combination of acti	2-1-1/NA 7.5.1 7.3 Combination ible crack widength M [kNm] 110.61 110.61 -7.66 -7.66 M [kNm] 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61 110.61	.4 of actions lth w, N [kN] -93.82 -20.11 2 N [kN] -93.82 -93.82	Quasi-perma max = 0.40 f _{cet} = 2.20 A _{cet} [cm ² /m] 666.67 *** No verifica *** No verifica *** M < M _{crex} [N/mm ²] 3.91 > f _{cet} 3.91 > f _{cet}	inent mm N/mm² Que [96] 1.51 6 stion neces: stion neces: (71.11 k	α _ε σ _ε [N/m 6.68 275 sary Nm): No v oncrete com : 0.60*f _α [N/mm*] 0 12.00 4 12.00	S _{i,max} m²] [mm] i.69 410.61 erification ne	ζ _{s.m} -ζ _{c.m} [*/oo] 1.057 cessary cessary g _s 0 [N/mr 275.69 4 0.00 4	[mm] 0.31 eeel tens .80*f,k m²]	Yes sile stress Check ok
supp.s. *) Eq. DIN EN 1992 Crack Control: EN 1 Check for Load - C Maximum permiss effective tensile stre with max. M exc.s. supp.s. with min. M exc.s. Stress Control: EN Combination of acti with max. M exc.s. supp.s. with min. M	1992-1-1 7.3 Combination ible crack wice and M [kNm] 110.61 110.65 1992-1-1 7.2 Constraint M [kNm] 110.61 110.61 110.61 110.61 110.61 110.61	A c = 4.4 of actions the w, N [kN] -93.82 -93.82 -20.11 -20.11 2 N [kN] -93.82 -93.82	A cet) quasi-perma max = 0.40 f _{cet} = 2.20 f _{cet} = 2.0 for of	inent mm N/mm² Ser [%] 1.51 € attion neces: (71.11 k Cate	α _ε σ _ε [N/m] 6.68 275 sary sary chm): No v concrete com 1: 0.60°f _α (N/m) 1: 12.00 4 12.00 4 12.00	m"] [mm] i.69 410.61 erification ne	Cam Con [*/00] 1.057 cessary cs Si Ga O [N/mr 275.69 4 0.00 4	[mm] 0.31 eeel tens .80*f,k n*] 00.00 00.00	Yes sile stress Check ok Yes Yes