

February 19, 2026 – Rev. 02


# **SORMAT Expert Document**

**Assessment of essential characteristics for 120 years working life of  
SE1000 and ITH HY Hybrid  
based on**

**EAD 330499-02-0601-v02, EAD 330087-02-0601-v01 and EAD 332402-00-0601-v01**

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**This assessment contains 9 pages**



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In Eurocode EN 1990 Table 2.1, maximum service lives are given for different classes, which must be taken into account when designing engineering structures. For class 5 (e.g. bridges and tunnels) the assumed service life is 100 years.

Fastening systems must be suitable and evaluated for the intended working life. The requirements for the assessment of various fastening systems for a working life of 50 and 100 years are regulated in the European Assessment Documents (EADs). EAD 330499-02-0601 applies to bonded anchors in concrete, EAD 330087-02-0601 applies to post-installed rebar connections and EAD 332402-00-0601 applies to post-installed rebar connections with improved bond splitting. All three EAD are cited in the OJEU.

For the products SE1000 Seismic and ITH HY Hybrid, EJOT/SORMAT has received an assessment of the fastening systems for the service life of 50 and 100 years with the following ETAs (European Technical Assessment) and UKTAs (UK Technical Assessment), respectively:

- ETA-20/1280 EJOT Injection system SE1000 for concrete
- ETA-22/0365 EJOT Injection system SE1000 for post-installed rebar
- ETA-23/1010 EJOT Injection system SE1000 for post-installed rebar with improved splitting
- ETA-24-0646 EJOT Injection system ITH HY Hybrid for concrete
- ETA-24-0648 EJOT Injection system ITH HY Hybrid for post-installed rebar
- ETA-24-0647 EJOT Injection system ITH HY Hybrid for post-installed rebar with improved splitting

The national appendix of Eurocode EN 1990 may deviate from the working lives in Table 2.1. According to National Annex NA of BS EN 1990 Table NA2.1, a working life of 120 years in class 5 is specified. There is currently no corresponding assessment document available for the assessment up to 120 years working life, neither for the EU nor for the UK.

After the new CPR got into force on 8<sup>th</sup> of January 2026, all not cited EAD falls back into draft status and ETAs based on this EAD are treated as technical documents only.

EAD 330499-02-0601-v02, EAD 330087-02-0601-v01 and EAD 332402-00-0601-v01 have not been cited in the OJEU. All three EADs provide the requirements for extending the working life to 120 years.

The characteristic values for working life 120 years in this report follow are assessed on these EADs. It includes the extension of sustained load tests at normal ambience and maximum long term temperature and the crack-movement tests to assess the long term behavior.

No additional tests were carried out to evaluate a working life of up to 120 years. The values determined below are based on the current state of knowledge about the corresponding behavior of the product used up to 120 years by extrapolating the corresponding test results to a service life of 120 years and assessing them.

The following tables only apply as an amendment to the information from the respective ETA, but are not part of the issued ETAs. The area of application (with the exception of the working life), the installation instructions or missing values can be found in the respective ETA. The indications given as to the working life of the product cannot be interpreted as a guarantee, but are regarded only as a mean for selecting suitable products in relation to the expected economically reasonable working life of the works.

For the characteristic values of shear loads under static and quasi-static loading as well as under seismic action (performance categories C1 and C2) for a working life of 120 years, the values for a working life of 100 years from the respective ETA applies.

**Based on ETA-20/1280 SORMAT Injection system SE1000 for concrete**

<b>Characteristic values of tension loads under static and quasi-static action; working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 in hammer drilled holes (HD) and compressed air drilled holes (CD)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$	[N/mm <sup>2</sup> ]	20	20	19	19	18	17	16	16
	II: 72°C/50°C				15	15	15	14	13	13	12	12
Characteristic bond resistance in uncracked concrete C20/25 in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,ucr,120}$	[N/mm <sup>2</sup> ]	17	16	16	16	15	14	14	13
	II: 72°C/50°C				14	14	14	13	13	12	12	11
	I: 40°C/24°C	flooded bore hole			16	16	16	15	15	14	14	13
	II: 72°C/50°C				14	14	14	13	13	12	12	11
Characteristic bond resistance in cracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,cr,120}$	[N/mm <sup>2</sup> ]	6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5
	II: 72°C/50°C				5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5
Reduction factor $\psi_{sus,120}^0$ in cracked and uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$	[-]	0,80							
	II: 72°C/50°C				0,68							
<b>Characteristic values of tension loads under seismic action (performance category C1); working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,eq,C1,120}$	[N/mm <sup>2</sup> ]	6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5
	II: 72°C/50°C				5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5
<b>Characteristic values of tension loads under seismic action (performance category C2); working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,eq,C2,120}$	[N/mm <sup>2</sup> ]	No parameter assessed	5,8	4,8	5,0	5,1	4,8	5,0	
	II: 72°C/50°C					5,0	4,1	4,3	4,4	4,1	4,3	

Based on ETA-20/1280 SORMAT Injection system SE1000 for concrete

**Characteristic values of tension loads under static and quasi-static action;  
working life of **120 years****

Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30	
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 in <b>diamond drilled holes (DD)</b>												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$	[N/mm <sup>2</sup> ]	15	14	14	13	12	12	11	11
	II: 72°C/50°C				11	11	10	10	9,5	9,0	8,5	8,5
Reduction factor $\psi_{sus,120}^0$ in uncracked concrete C20/25 in <b>diamond drilled holes (DD)</b>												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$	[-]	0,73							
	II: 72°C/50°C				0,70							

Based on ETA-22/0365 SORMAT Injection system SE1000 for post-installed rebar

**Minimum anchorage length and minimum lap length under static or quasi-static loading and under seismic action; working life **120 years****

**Amplification factor  $\alpha_{lb,120y} = \alpha_{lb,seis,120y}$  related to concrete class and drilling method;**

Concrete class	Drilling method	Bar size	Amplification factor $\alpha_{lb,120y}$ $= \alpha_{lb,seis,120y}$
C12/15 <sup>1)</sup> to C50/60	all drilling methods	8 <sup>1)</sup> mm to 40 mm	1,0

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Reduction factor  $k_{lb,120y} = k_{lb,seis,120y}$  for all drilling methods**

Rebar	Concrete classes								
$\phi$	C12/15 <sup>1)</sup>	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 <sup>1)</sup> to 40 mm	1,0								

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Design values of the ultimate bond stress  $f_{bd,PIR,120y}$  and  $f_{bd,PIR,seis,120y}$  in N/mm<sup>2</sup> for all drilling methods and for good conditions**

Rebar	Concrete classes								
$\phi$	C12/15 <sup>1)</sup>	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 <sup>1)</sup> to 32 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
34 mm	1,6	2,0	2,3	2,6	2,9	3,3	3,6	3,9	4,2
36 mm	1,5	1,9	2,2	2,6	2,9	3,3	3,6	3,8	4,1
40 mm	1,5	1,8	2,1	2,5	2,8	3,1	3,4	3,7	4,0

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Based on ETA-23/1010 SORMAT Injection system SE1000 for post-installed rebar with improved bond splitting**

<b>Characteristic resistance to tension load under static and quasi-static loading; working life 120 years</b>																
<b>Reinforcing bar</b>				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40	
<b>Combined pull-out and concrete failure</b>																
Characteristic resistance in uncracked concrete C20/25 in <b>hammer drilled holes (HD) and compressed air drilled holes (CD)</b>																
Temperature range	I: 24°C/40°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$ [N/mm <sup>2</sup> ]	16	16	16	16	16	16	15	15	15	15	15	15	
	II: 50°C/72°C			12	12	12	12	12	12	12	12	12	11	11	11	11
Characteristic resistance in uncracked concrete C20/25 in <b>hammer drilled holes with hollow drill bit (HDB)</b>																
Temperature range	I: 24°C/40°C	Dry, wet concrete	$\tau_{Rk,ucr,120}$ [N/mm <sup>2</sup> ]	14	14	13	13	13	13	13	13	13	13	13	1)	
	II: 50°C/72°C			12	12	12	11	11	11	11	11	11	11	11		
	I: 24°C/40°C	flooded bore hole		13	13	13	13	13	13	13	13	13	13	13		
	II: 50°C/72°C			11	11	11	11	11	11	11	11	11	11	11		
Reduction factor $\psi_{sus,120}^0$ in cracked and uncracked concrete C20/25 in <b>hammer drilled holes (HD), hammer drilled holes with hollow drill bit (HDB) and compressed air drilled holes (CD)</b>																
Temperature range	I: 24°C/40°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$ [-]	0,80												
	II: 50°C/72°C			0,68												
1) no performance assessed																
<b>Reinforcing bar</b>				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40	
<b>Combined pull-out and concrete failure</b>																
Characteristic resistance in uncracked concrete C20/25 in <b>diamond drilled holes (DD)</b>																
Temperature range	I: 24°C/40°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$ [N/mm <sup>2</sup> ]	14	13	13	13	12	12	11	11	11	11	11	10	
	II: 50°C/72°C			11	10	10	10	9,5	9,0	9,0	9,0	9,0	8,5	8,5	8,0	8,0
Reduction factor $\psi_{sus,120}^0$ in cracked and uncracked concrete C20/25 in <b>diamond drilled holes (DD)</b>																
Temperature range	I: 24°C/40°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$ [-]	0,73												
	II: 50°C/72°C			0,70												

**Based on ETA-24-0646 SORMAT Injection system ITH HY Hybrid for concrete**

<b>Characteristic values of tension loads under static and quasi-static action; working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 in hammer drilled holes (HD) , compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$	[N/mm <sup>2</sup> ]	17	17	16	15	14	13	13	13
	II: 80°C/50°C				17	17	16	15	14	13	13	13
Characteristic bond resistance in cracked concrete C20/25 in hammer drilled holes (HD) , compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,cr,120}$	[N/mm <sup>2</sup> ]	5,5	6,0	6,5	6,5	6,5	6,5	6,5	6,5
	II: 80°C/50°C				5,5	6,0	6,5	6,5	6,5	6,5	6,5	6,5
Reduction factor $\psi_{sus,120}^0$ in cracked and uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$	[-]	0,90							
	II: 80°C/50°C				0,87							
<b>Characteristic values of tension loads under seismic action (performance category C1); working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 25 in hammer drilled holes (HD) , compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,eq,C1,120}$	[N/mm <sup>2</sup> ]	5,5	6	6,5	6,5	6,5	6,5	6,5	6,5
	II: 80°C/50°C				5,5	6	6,5	6,5	6,5	6,5	6,5	6,5
<b>Characteristic values of tension loads under seismic action (performance category C2); working life of 120 years</b>												
Threaded rod					M8	M10	M12	M16	M20	M24	M27	M30
<b>Combined pull-out and concrete failure</b>												
Characteristic bond resistance in uncracked concrete C20/25 25 in hammer drilled holes (HD) , compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,eq,C2,120}$	[N/mm <sup>2</sup> ]	No parameter assessed	3,6	3,5	3,3	2,3	No parameter assessed		
	II: 80°C/50°C					3,6	3,5	3,3	2,3			

Based on ETA-24-0648 SORMAT Injection system ITH HY Hybrid for post-installed rebar

**Minimum anchorage length and minimum lap length under static or quasi-static loading and under seismic action; working life **120 years****

**Amplification factor  $\alpha_{lb,120y} = \alpha_{lb,seis,120y}$  related to concrete class and drilling method;**

Concrete class	Drilling method	Bar size	Amplification factor $\alpha_{lb,120y}$ $= \alpha_{lb,seis,120y}$
C12/15 <sup>1)</sup> to C50/60	all drilling methods	8 <sup>1)</sup> mm to 32 mm	1,0

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Reduction factor  $k_{lb,120y} = k_{lb,seis,120y}$  for all drilling methods**

Rebar	Concrete classes								
$\phi$	C12/15 <sup>1)</sup>	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 <sup>1)</sup> to 32 mm	1,0								

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Design values of the ultimate bond stress  $f_{bd,PIR,120y}$  and  $f_{bd,PIR,seis,120y}$  in N/mm<sup>2</sup> for all drilling methods and for good conditions**

Rebar	Concrete classes								
$\phi$	C12/15 <sup>1)</sup>	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 <sup>1)</sup> to 32 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3

<sup>1)</sup> Size 8mm and concrete C12/15 only valid for static or quasi-static loading

**Based on ETA-24-0647 SORMAT Injection system ITH HY Hybrid for post-installed rebar with improved bond splitting**

**Characteristic resistance to tension load under static and quasi-static loading; working life 120 years**

<b>Reinforcing bar</b>	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
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**Combined pull-out and concrete failure**

Characteristic resistance in uncracked concrete C20/25 in **hammer drilled holes (HD), hammer drilled holes with hollow drill bit (HDB) and compressed air drilled holes (CD)**

Temperature range I: 24°C/40°C II: 50°C/80°C	Dry, wet concrete and flooded bore hole	$\tau_{Rk,ucr,120}$	[N/mm <sup>2</sup> ]	14	14	14	14	13	13	13	13	13	13
				14	14	14	14	13	13	13	13	13	13

Reduction factor  $\psi_{sus,120}^0$  in cracked and uncracked concrete C20/25 in **hammer drilled holes (HD), hammer drilled holes with hollow drill bit (HDB) and compressed air drilled holes (CD)**

Temperature range I: 24°C/40°C II: 50°C/80°C	Dry, wet concrete and flooded bore hole	$\psi_{sus,120}^0$	[-]	0,90
				0,87