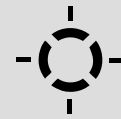
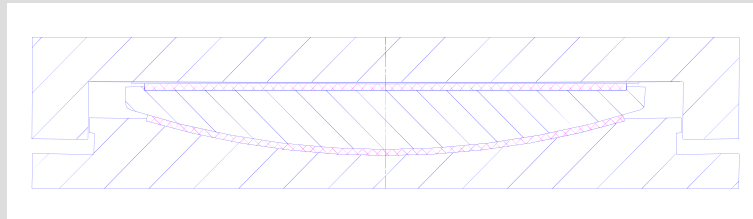


RESTON[®]SPHERICAL (RSL)

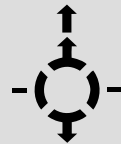
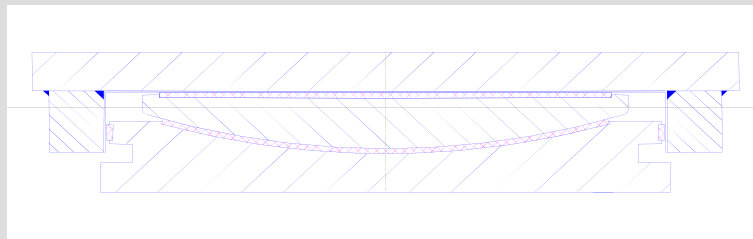
EN 1337-7

ETA-8/0115
ROBO[®]SLIDE가

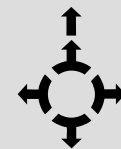
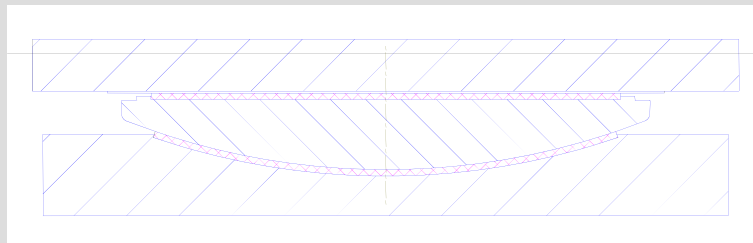
KF



KE



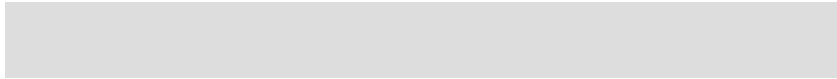
KA



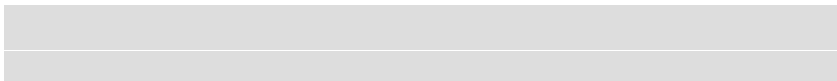
0672-CPD-001
EN 1337-7

- Structural design and certification
in accordance with EN 1337-7
- Certified with
CE mark of conformity





		2
		3
		4
		5
ROBO®SLIDE		6
		7
KF	-	8
KE	- 가	10
KA	- 가	12
		14
		15
		16



RESTON®SPHERICAL

RESTON®SPHERICAL
 RESTON®SPHERICAL
 RESTON®SPHERICAL, 가
 RESTON®SPHERICAL, 가 가

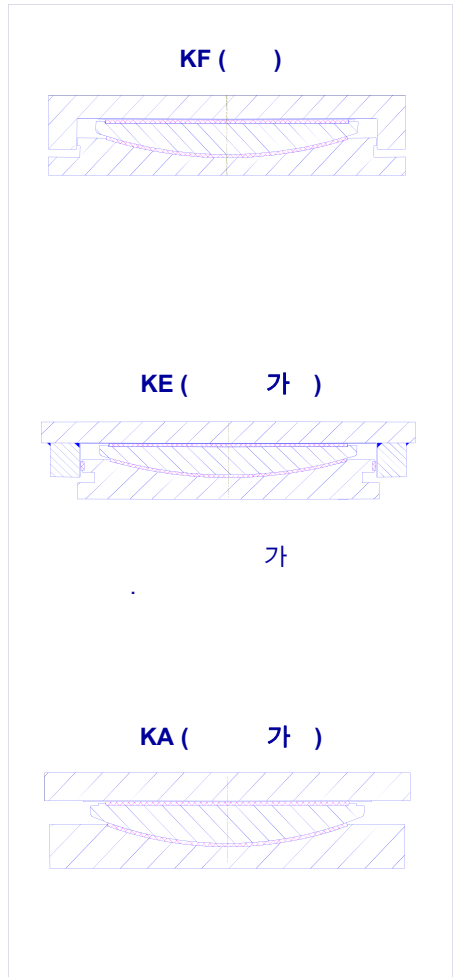


40 RESTON®SPHERICAL
 50,000

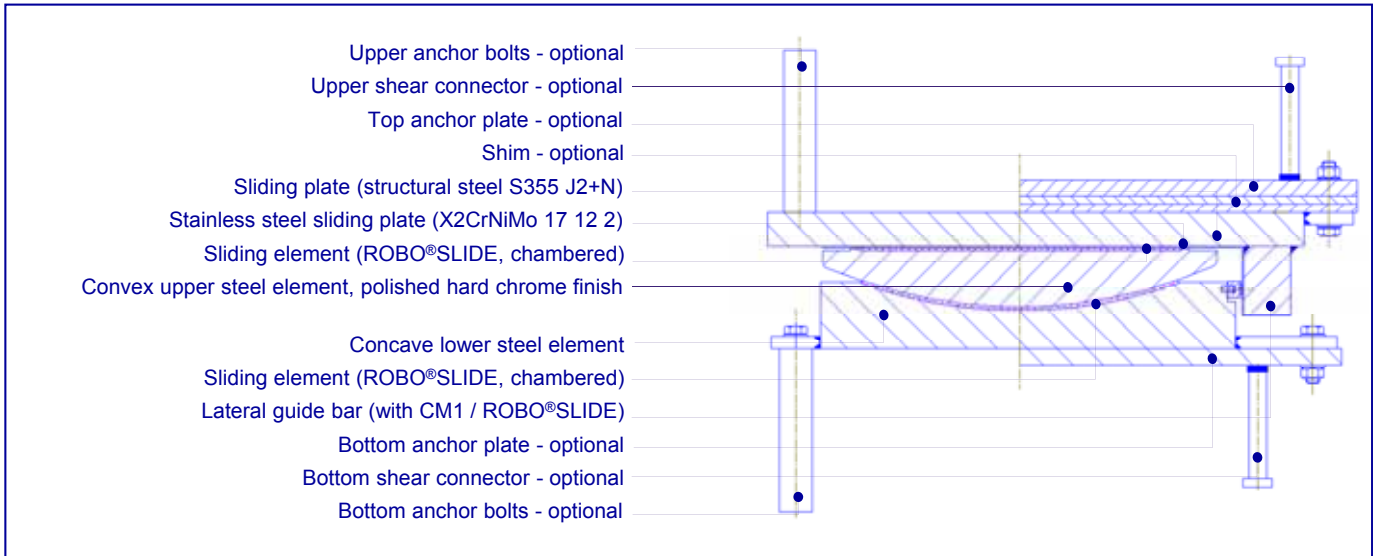
RESTON®SPHERICAL

-
-
- : 8mm ROBO®SLIDE
- CM1
- (ISO9001 & EN ISO3834-2)
- MPA Stuttgart
-

ROBO®SLIDE가 RESTON®SPHERICAL CE



가 , RESTON®SPHERICAL



ROBO®SLIDE 가

ROBO®SLIDE 가
가



• S355 S235 ROBO®SLIDE
•
•
•



(C4 in accordance with ISO12944)
 • SA3 (SA2.5)
 • ()
 • 2K 3

Actions – loads EC 1

8 13 Eurocode 1(EN 1991-2: "new design concept", DIN, AASHTO, BS, SIA



CE
가

EN 1337

RESTON®SPHERICAL EN 1337
EN 1337

(1) EN 1337-2 : “
가 “

가

(2) EN 1337-2 : “ EN 1337-11
가
1% ”

Stuttgart system)가 2 가 3 (MPA



3-

RESTON®SPHERICAL EN 1337-7
가
3-
(Faltenbalgen)

: 8 13
KE : 100 mm : 0 mm
KA : 100 mm : 40 mm
가
: 0.010 EN 1337-1
: ROBO®SLIDE
(6)

MPA Stuttgart

MPA Stuttgart

EN 1337 가





RESTON®SPHERICAL

가 가

가

가

가

가

CE

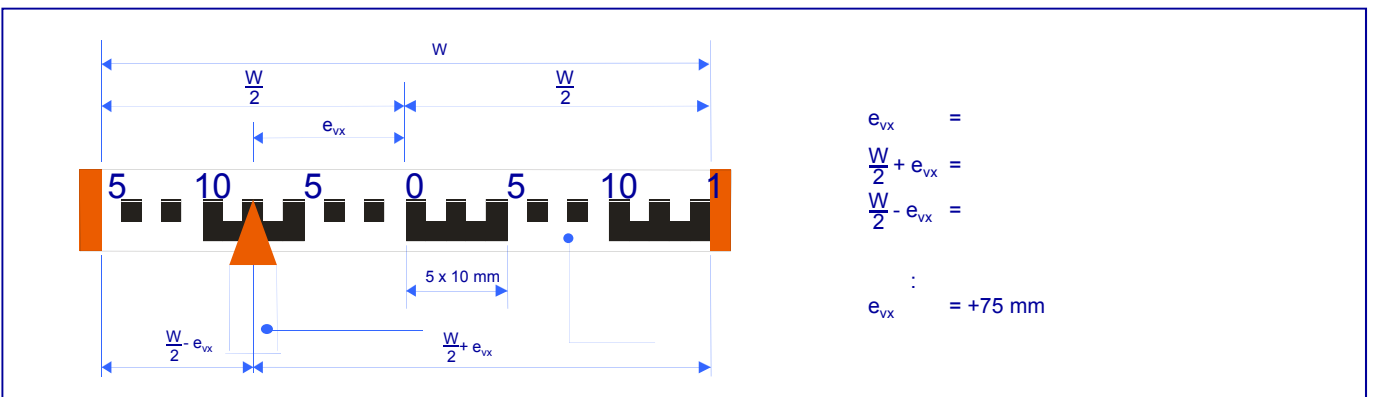
RESTON®SPHERICAL
ROBO®SLIDE가
08/0115

EN 1337-7
RESTON®SPHERICAL

ETA-

CE 가

<p>ISO 9001 EN 3834-2</p>		Typ/Type	KX-X	$v_x \pm$	x	mm	<p>0672-CPD-001 ETA-08/0115</p> <p>WERK B</p>	CE
	A-Nr./P-No.	XX	e_{vx}	x	mm			
	Jahr/Year	20XX	$v_y \pm$	x	mm			
	Ort/Location		e_{vy}	x	mm			
	$N_{sd,max}/V_{sd,max}$	XXX / XXX			kN			



ROBO®SLIDE ?

ROBO®SLIDE

ROBO®SLIDE :

- $f_k = 180 \text{ N/mm}^2$
- 가
- ETA-08/0115
- (-50°C)

ROBO®SLIDE

ROBO®SLIDE

가 (50)

ROBO®SLIDE

가

ROBO®SLIDE

가

가

ROBO®SLIDE skid number (when $T > -35^\circ$):

$$\mu = \frac{1,6}{\sigma_{RSL2} + 15} \text{ where } 0.02 \leq \mu \leq 0.08$$

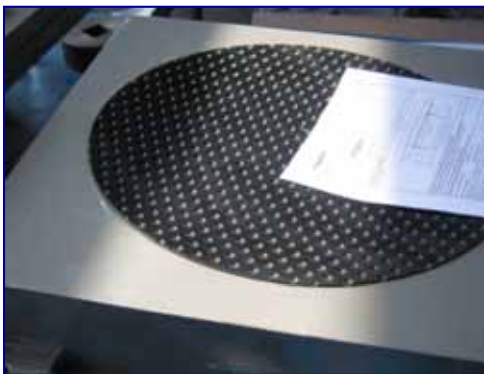
σ_{RSL2} = average ROBO®SLIDE stress

Horizontal friction force:

KA bearing: $V_{xSd} = N_{Sd} \cdot \mu_{RSL}$

KE bearing: $V_{xSd} = N_{Sd} \cdot \mu_{RSL} + V_y \cdot \mu$

- V_{xSd} : Horizontal friction force
- N_{Sd} : Normal force on bearing
- V_y : Shear force on bearing



Deutsches Institut für Bautechnik (DIBt) (German Institute for Constructional Engineering) Stuttgart(MPA)

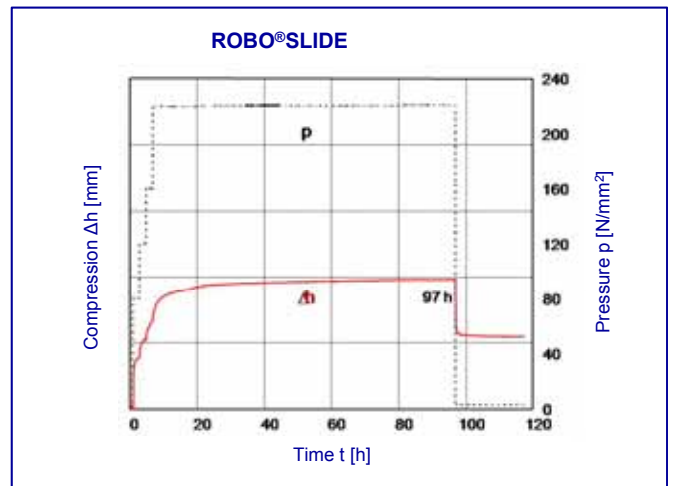
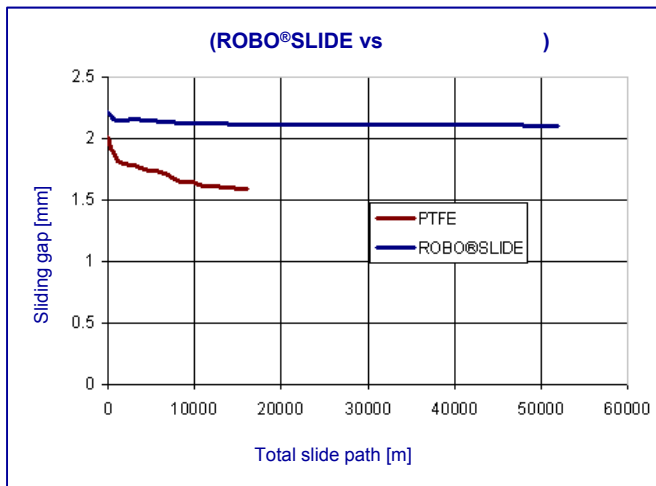
EN 1337

($\mu < 0.02$).

50,000m

, ROBO®SLIDE

가



Bearable stresses
(char. values, T < 35°C)

- (): 180 N/mm²
- 가 (): 180 N/mm²
- 가 (): 60 N/mm²
- $\gamma_M = 1.4$ in accordance with EN 1990

“new design concept” Eurocode 1 (EN 1991-2)
 ROBO®SLIDE ETA
 PTFE , EN 1337-7
 EN 1337-1 가
 EN 1337-7



ROBO®SLIDE

ETA 가
 The Deutsches Institut für Bautechnik (German Institute for Constructional Engineering) EOTA (European Organisation for Technical Approvals) ROBO®SLIDE

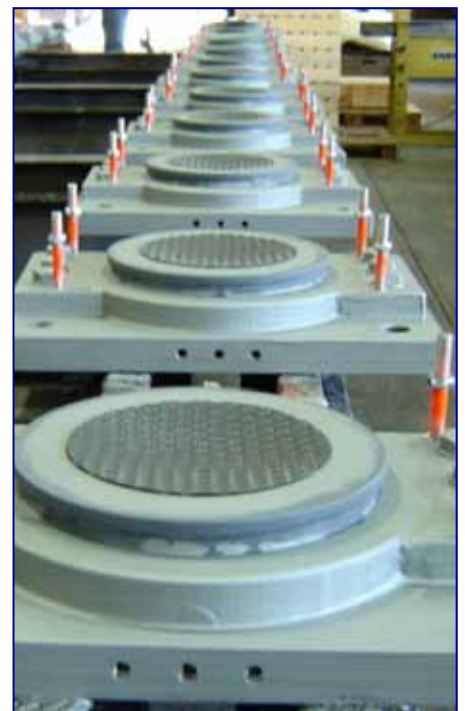
ROBO®SLIDE 50

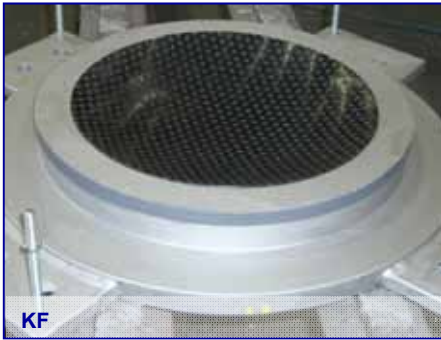
ROBO®SLIDE RESTON®SPHERICAL

- 가
- (50)
-
-

(8 13) 가

가, 가 (35) : EN 1337-1
 4%





RESTON®SPHERICAL KF

가

. KF

0

1mm

V_{xy}

10%

30%

EC 2()

ROBO®SLIDE L2

(C50/60)

C 30/37

	[kN]			가				가							
	N _{Rd,max}	N _{Rd,min}	Horizontal V _{xyRd,max}	[mm]			[kg]	[mm]						[kg]	
				A	B	H		A	B	APU _x	APU _y	APO _x	APO _y		H
KF 1.0	1'000	300	100	182	228	76	32	177	223	316	316	316	316	141	69
KF 2.0	2'000	600	200	236	292	80	48	236	292	330	330	350	350	137	90
KF 3.0	3'000	900	300	289	340	89	66	289	338	370	370	380	380	147	120
KF 4.0	4'000	1'200	400	332	375	90	80	327	375	390	390	410	410	143	139
KF 5.0	5'000	1'500	500	364	415	98	100	363	401	405	405	425	425	151	161
KF 6.0	6'000	1'800	600	396	441	102	117	385	432	446	430	455	455	151	185
KF 7.0	7'000	2'100	700	434	487	105	145	417	472	476	460	495	495	148	215
KF 8.0	8'000	2'400	800	461	523	104	163	446	514	509	485	535	535	138	232
KF 9.0	9'000	2'700	900	496	581	99	186	456	530	519	500	550	550	137	245
KF 10.0	10'000	3'000	1'000	514	570	108	200	489	561	580	526	585	585	138	278
KF 12.0	12'000	3'600	1'200	556	602	125	257	509	580	586	562	600	600	146	314
KF 15.0	15'000	4'500	1'500	620	671	147	375	595	667	684	637	690	690	160	454
KF 20.0	20'000	6'000	2'000	715	761	165	538	655	769	748	732	790	790	168	624
KF 25.0	25'000	7'500	2'500	802	884	172	750	787	876	848	810	900	900	189	881
KF 30.0	30'000	9'000	3'000	880	1'027	167	944	812	988	912	897	1'010	1'010	191	1'140
KF 40.0	40'000	12'000	4'000	1'031	1'237	168	1'389	951	1'173	1'054	1'029	1'195	1'195	215	1'776
KF 50.0	50'000	15'000	5'000	1'155	1'403	181	1'920	1'133	1'374	1'193	1'155	1'402	1'401	241	2'657

N_{Rd,max} : ()
 N_{Rd,min} : V_{xyRd,max}
 V_{xyRd,max} :

. SLS

Δw, EN 1337-1

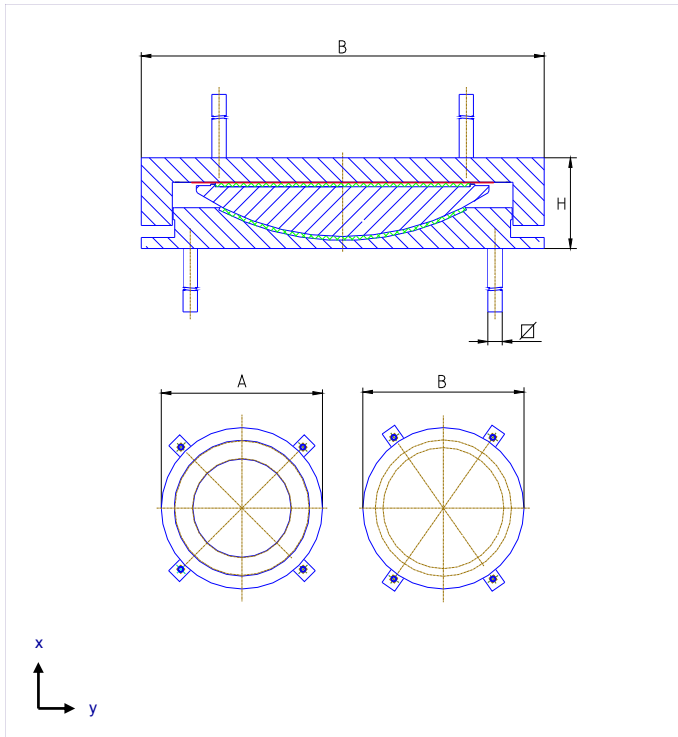
가

f_{d,RSL} = 180/1.4 N/mm²

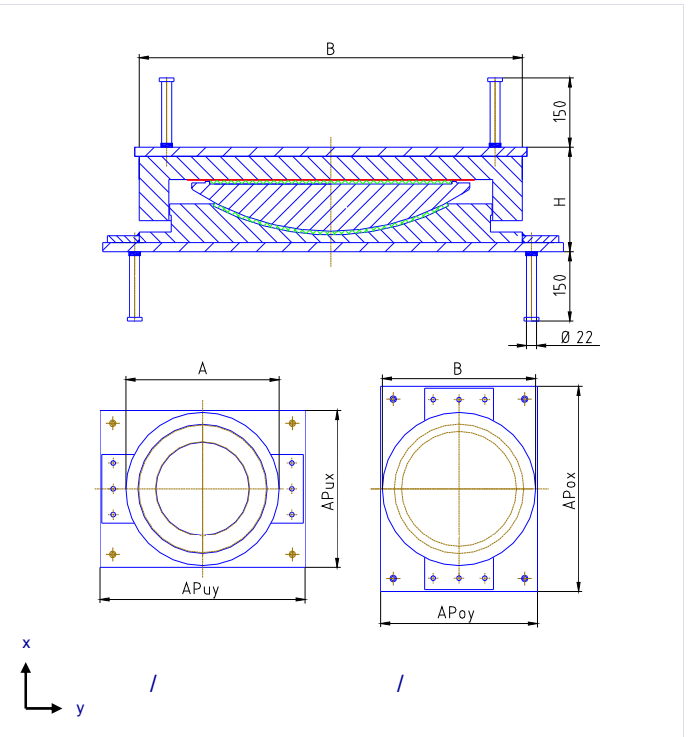
Note:

H 10mm

가



가



C 50/60

	[kN]			가				가							
	N _{Rd,max}	N _{Rd,min}	Horizontal	[mm]			[kg]	[mm]						[kg]	
			V _{xyRd,max}	A	B	H		A	B	APU _x	APU _y	APO _x	APO _y		H
KF 1.0	1'000	300	100	182	228	76	32	177	219	316	316	316	316	131	66
KF 2.0	2'000	600	200	236	292	80	48	225	279	325	325	340	340	139	86
KF 3.0	3'000	900	300	274	340	89	65	263	327	355	355	375	375	148	112
KF 4.0	4'000	1'200	400	307	375	85	74	307	373	390	390	405	405	143	136
KF 5.0	5'000	1'500	500	339	413	89	90	328	404	410	410	430	430	151	161
KF 6.0	6'000	1'800	600	366	446	89	103	350	432	435	435	455	455	151	182
KF 7.0	7'000	2'100	700	382	472	96	122	377	463	450	450	485	485	150	204
KF 8.0	8'000	2'400	800	409	503	95	135	409	497	475	475	520	520	149	230
KF 9.0	9'000	2'700	900	447	541	89	144	436	526	500	500	550	550	144	251
KF 10.0	10'000	3'000	1'000	469	563	95	166	458	556	515	515	580	580	142	273
KF 12.0	12'000	3'600	1'200	491	593	94	184	496	600	550	550	620	620	147	324
KF 15.0	15'000	4'500	1'500	545	667	96	233	528	646	580	580	670	670	164	405
KF 20.0	20'000	6'000	2'000	615	771	99	320	599	747	650	650	770	770	162	527
KF 25.0	25'000	7'500	2'500	680	868	117	468	653	821	705	705	845	845	188	710
KF 30.0	30'000	9'000	3'000	756	972	120	599	718	926	780	780	950	950	184	894
KF 40.0	40'000	12'000	4'000	896	1'184	136	1'012	821	1'101	905	905	1'125	1'125	207	1'417
KF 50.0	50'000	15'000	5'000	1'032	1'366	153	1'500	940	1'274	1'025	1'025	1'305	1'304	219	2'036

N_{Rd,max} : ()
 N_{Rd,min} :
 V_{xyRd,max} : V_{xyRd,max}

. SLS

Δw, EN 1337-1

가

f_{d,RS} = 180/1.4 N/mm²

Note:

H 10mm



RESTON®SPHERICAL KE

0 2mm 가 가 가 CM1
ROBO®SLIDE

V_{xy} 10% 30%

EC 2()

ROBO®SLIDE L2
(C50/60)

C 30/37

	[kN]			가						가									
	$N_{Rd,max}$	$N_{Rd,min}$	Horizontal $V_{xyRd,max}$	[mm]					[kg]	[mm]								H	[kg]
				A_x	A_y	B	L	H		A_x	A_y	B	L	APU_x	APU_y	APO_x	APO_y		
KE 1.0	1'000	300	100	224	200	310	320	95	53	178	170	265	310	410	316	405	330	150	85
KE 2.0	2'000	600	200	231	231	330	351	110	76	205	175	310	345	405	316	450	365	168	113
KE 3.0	3'000	900	300	286	286	390	406	117	112	259	215	375	385	470	316	515	405	170	158
KE 4.0	4'000	1'200	400	333	333	445	453	117	141	270	235	400	410	490	329	540	430	192	200
KE 5.0	5'000	1'500	500	369	369	495	489	127	184	297	260	435	435	530	364	575	455	195	239
KE 6.0	6'000	1'800	600	402	402	530	522	132	217	315	280	455	455	545	391	595	475	205	271
KE 7.0	7'000	2'100	700	440	470	565	590	127	257	360	310	505	480	590	438	645	500	201	328
KE 8.0	8'000	2'400	800	463	463	600	583	148	313	375	480	505	600	595	500	645	620	181	370
KE 9.0	9'000	2'700	900	490	505	630	625	143	345	402	500	540	620	635	520	680	640	181	410
KE 10.0	10'000	3'000	1'000	515	520	655	640	148	379	428	520	570	640	660	540	710	660	181	445
KE 12.0	12'000	3'600	1'200	561	600	705	720	153	475	476	555	640	675	730	575	780	695	192	563
KE 15.0	15'000	4'500	1'500	622	622	790	742	179	644	518	605	685	725	770	629	825	745	205	700
KE 20.0	20'000	6'000	2'000	716	716	890	836	203	944	583	665	765	785	845	728	905	805	237	1'009
KE 25.0	25'000	7'500	2'500	814	814	1'000	934	206	1'221	623	710	820	830	895	803	960	850	269	1'312
KE 30.0	30'000	9'000	3'000	869	869	1'075	989	248	1'675	670	765	885	885	950	878	1'025	905	292	1'657
KE 40.0	40'000	12'000	4'000	1'010	1'010	1'235	1'130	258	2'348	799	1'015	1'010	1'135	1'080	1'035	1'150	1'155	296	2'444
KE 50.0	50'000	15'000	5'000	1'128	1'155	1'370	1'275	289	3'348	930	1'125	1'170	1'245	1'235	1'152	1'310	1'265	327	3'461

L (W) 100mm
(: W= 350 mm , L 250 mm가 가)
 $N_{Rd,max}$:
 $N_{Rd,min}$:
 $V_{xyRd,max}$:

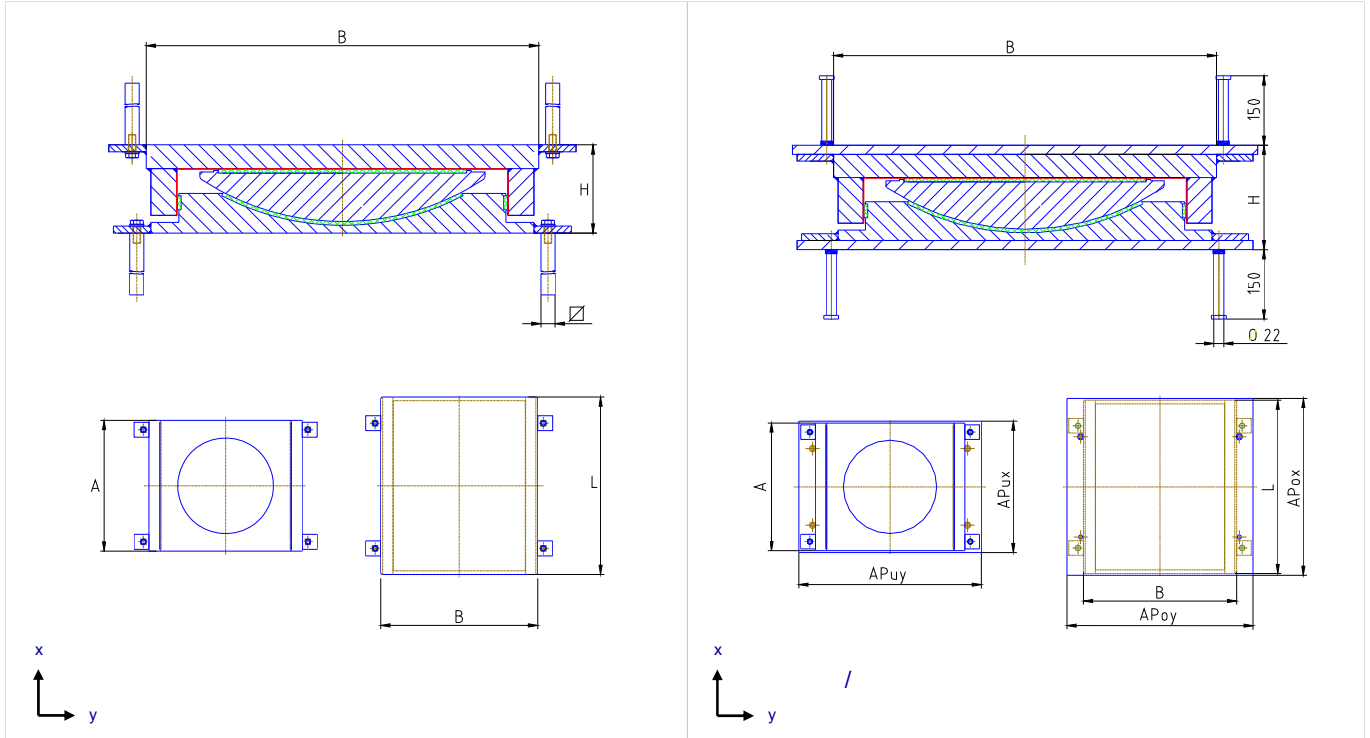
. SLS Δw , EN 1337-1 가

Note: $f_{d,RSL}=180/1.4 \text{ N/mm}^2$

H 10mm

가

가



C 50/60

	[kN]			가					[kg]	가								[kg]	
	NRd,max	NRd,min	Horizontal VyRd,max	[mm]						[mm]									
				Ax	Ay	B	L	H		Ax	Ay	B	L	APU_x	APU_y	APO_x	APO_y		H
KE 1.0	1'000	300	100	177	170	265	310	107	52	176	170	265	310	410	316	405	330	150	85
KE 2.0	2'000	600	200	221	200	320	350	110	71	205	175	310	345	405	316	450	365	168	113
KE 3.0	3'000	900	300	248	230	360	380	123	97	257	215	370	385	470	316	510	405	161	147
KE 4.0	4'000	1'200	400	277	255	400	410	128	124	270	235	400	410	490	316	540	430	183	188
KE 5.0	5'000	1'500	500	324	325	450	445	128	155	297	260	435	435	530	322	575	455	183	217
KE 6.0	6'000	1'800	600	329	310	470	455	138	181	320	280	460	455	550	342	600	475	184	241
KE 7.0	7'000	2'100	700	356	340	500	480	138	203	360	310	505	480	595	372	645	500	182	284
KE 8.0	8'000	2'400	800	384	370	525	505	138	227	384	330	545	505	635	392	685	525	182	324
KE 9.0	9'000	2'700	900	418	400	565	525	143	266	383	340	550	515	635	402	690	535	199	360
KE 10.0	10'000	3'000	1'000	409	515	550	635	139	301	426	365	595	540	680	427	735	560	192	401
KE 12.0	12'000	3'600	1'200	460	445	630	570	153	352	442	390	615	565	695	452	755	585	208	471
KE 15.0	15'000	4'500	1'500	493	590	660	710	154	460	485	435	675	610	750	497	815	630	220	596
KE 20.0	20'000	6'000	2'000	577	580	775	700	179	636	558	500	770	675	840	562	910	695	240	839
KE 25.0	25'000	7'500	2'500	662	775	845	895	172	856	612	710	810	830	885	730	950	850	241	1'124
KE 30.0	30'000	9'000	3'000	697	820	900	940	191	1'072	670	765	885	885	950	785	1'025	905	255	1'396
KE 40.0	40'000	12'000	4'000	816	1'015	1'030	1'135	196	1'543	750	905	990	1'025	1'055	925	1'130	1'045	288	2'071
KE 50.0	50'000	15'000	5'000	917	1'015	1'170	1'135	232	2'122	831	985	1'090	1'105	1'145	1'005	1'230	1'125	314	2'684

L (: (W) 100mm W= 350 mm , L 250 mm가 가).
 $N_{Rd,max}$: ()
 $N_{Rd,min}$: $V_{xyRd,max}$
 $V_{xyRd,max}$:

. SLS

Δw , EN 1337-1

가

$f_{d,RSL}=180/1.4 \text{ N/mm}^2$

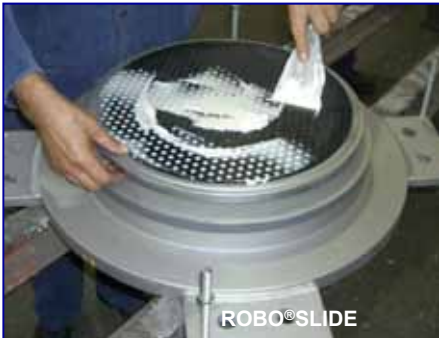
Note:

H 10mm



RESTON®SPHERICAL KA

KA 가가 ±20 mm , ±50mm



ROBO®SLIDE L2 (C50/60)

EC 2()

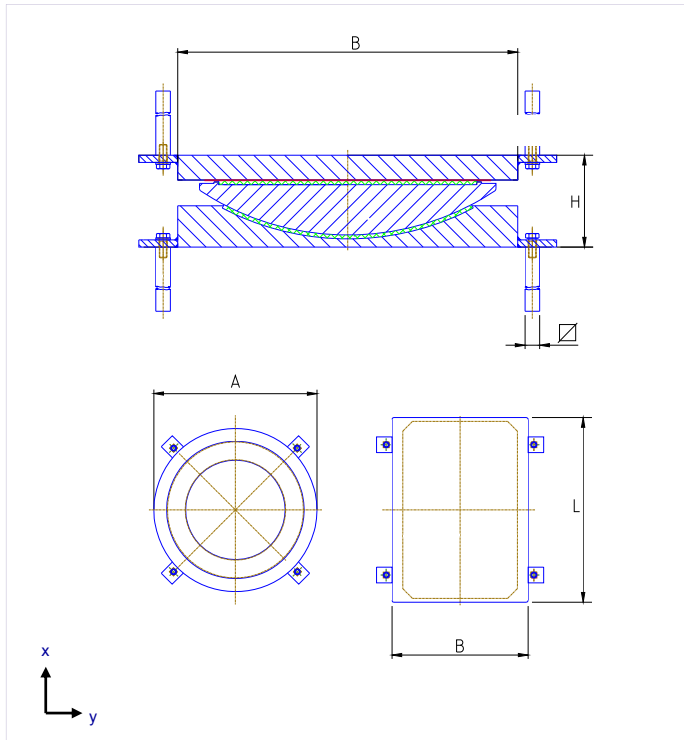
C 30/37

	[kN]		가						가							
	NRd,max	NRd,min	[mm]				[kg]	[mm]								[kg]
			A	B	L	H		A	B	L	APU_x	APU_y	APO_x	APO_y	H	
KA 1.0	1'000	300	183	243	303	67	30	126	215	290	316	316	345	316	102	46
KA 2.0	2'000	600	236	296	356	70	43	171	260	320	316	316	390	340	114	63
KA 3.0	3'000	900	278	338	398	77	60	205	295	355	340	316	425	375	124	84
KA 4.0	4'000	1'200	320	380	440	81	76	235	325	385	365	321	455	405	124	98
KA 5.0	5'000	1'500	364	424	484	83	95	257	350	410	390	354	480	430	135	120
KA 6.0	6'000	1'800	397	457	517	86	115	285	375	435	420	389	505	455	137	141
KA 7.0	7'000	2'100	417	477	537	104	152	301	395	455	435	422	525	475	148	168
KA 8.0	8'000	2'400	456	516	576	93	158	331	425	485	465	452	555	505	146	191
KA 9.0	9'000	2'700	479	539	599	104	193	339	430	490	478	478	560	510	158	224
KA 10.0	10'000	3'000	507	567	627	103	214	368	460	520	506	506	590	540	158	254
KA 12.0	12'000	3'600	548	608	668	120	284	386	480	540	560	560	610	560	186	341
KA 15.0	15'000	4'500	616	676	736	129	390	452	545	605	625	625	675	625	191	447
KA 20.0	20'000	6'000	708	768	828	138	539	536	630	690	709	709	760	710	206	638
KA 25.0	25'000	7'500	797	857	917	142	688	574	665	725	799	799	800	798	236	919
KA 30.0	30'000	9'000	881	941	1'001	141	835	637	740	800	862	862	870	856	268	1'189
KA 40.0	40'000	12'000	1'022	1'082	1'142	157	1'246	837	945	1'005	1'028	1'028	1'080	1'030	237	1'619
KA 50.0	50'000	15'000	1'147	1'207	1'267	178	1'785	914	1'017	1'077	1'139	1'139	1'150	1'133	283	2'310

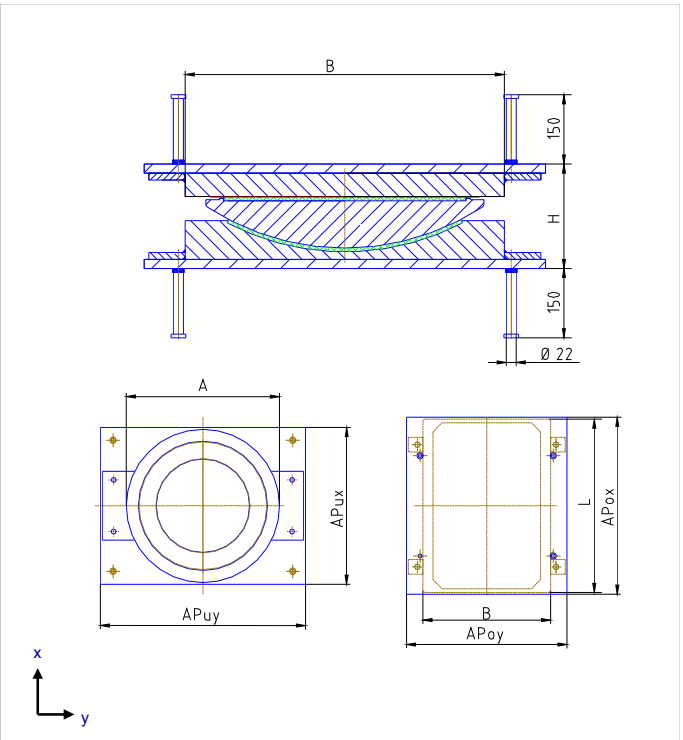
NRd,max : (W=350 mm and W'=100 mm L 250mm B 60mm 가 (W) 가)

Note: f_{d, RSL} = 180/1.4 N/mm² . SLS Δw, EN 1337-1 가 H 10mm

가



가



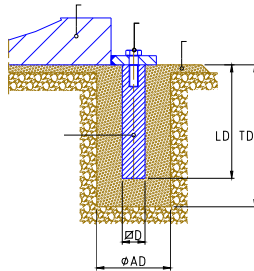
C 50/60

	[kN]		가					가								
	NRd,max	NRd,min	[mm]				[kg]	[mm]						[kg]		
			A	B	L	H		A	B	L	APU_x	APU_y	APO_x		APO_y	H
KA 1.0	1'000	300	126	215	290	67	25	126	215	290	316	316	345	316	102	46
KA 2.0	2'000	600	175	265	325	72	33	171	260	320	316	316	390	340	114	63
KA 3.0	3'000	900	276	336	396	77	60	205	295	355	340	316	425	375	117	78
KA 4.0	4'000	1'200	309	369	429	77	71	235	325	385	365	316	455	405	117	91
KA 5.0	5'000	1'500	344	404	464	77	83	259	350	410	390	322	480	430	119	104
KA 6.0	6'000	1'800	369	429	489	80	96	287	375	435	420	316	505	455	119	118
KA 7.0	7'000	2'100	395	455	515	83	112	303	395	455	435	365	525	475	125	137
KA 8.0	8'000	2'400	417	477	537	83	123	322	415	475	455	385	545	495	123	148
KA 9.0	9'000	2'700	438	498	558	86	137	339	430	490	470	401	560	510	129	164
KA 10.0	10'000	3'000	459	519	579	88	153	358	450	510	490	420	580	530	129	179
KA 12.0	12'000	3'600	497	557	617	98	198	391	480	540	525	453	610	560	131	209
KA 15.0	15'000	4'500	551	611	671	98	237	431	525	585	565	494	655	605	147	274
KA 20.0	20'000	6'000	628	688	748	109	336	497	590	650	630	560	720	670	154	371
KA 25.0	25'000	7'500	699	759	819	122	473	564	655	715	695	630	785	735	157	472
KA 30.0	30'000	9'000	758	818	878	132	596	627	722	782	760	699	855	805	171	636
KA 40.0	40'000	12'000	890	950	1'010	151	924	696	790	850	830	800	925	875	193	867
KA 50.0	50'000	15'000	879	990	1'050	206	1'291	800	909	969	930	904	1'040	990	194	1'153

B L 100mm (W) 40mm 가 (W')
 . (. W=350 mm and W'=100 mm L 250mm B 60mm 가)
 NRd,max : ()

. SLS Δw, EN 1337-1 가
 Note: fd,RS�=180/1.4 N/mm² H 10mm

- KF KE
- 가

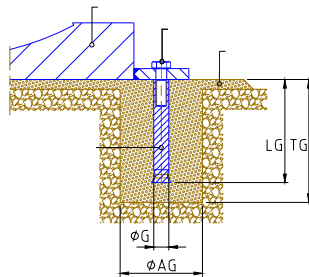


Note:

가 가

Screw	Anchor bolts		Recess	
	$\varnothing D$	LD	$\varnothing AD$	TD
M 12	30	180	150	250
M 16	40	200	150	250
M 20	50	250	150	300
M 24	60	300	150	350
M 27	70	300	150	350

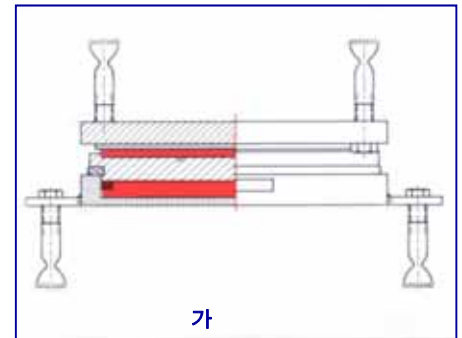
- 가 KA
- 가



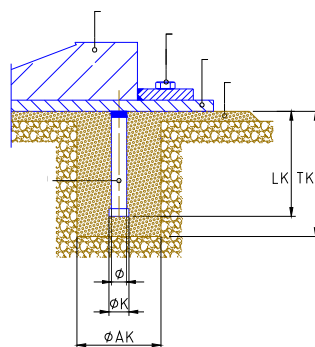
Recess:

가
Recess($\varnothing A, T$)

Screw	Threaded sleeve anchor		Recess	
	$\varnothing G$	LG	$\varnothing AG$	TG
M 12	17	100	150	150
M 16	22	150	150	200
M 20	26	150	150	200

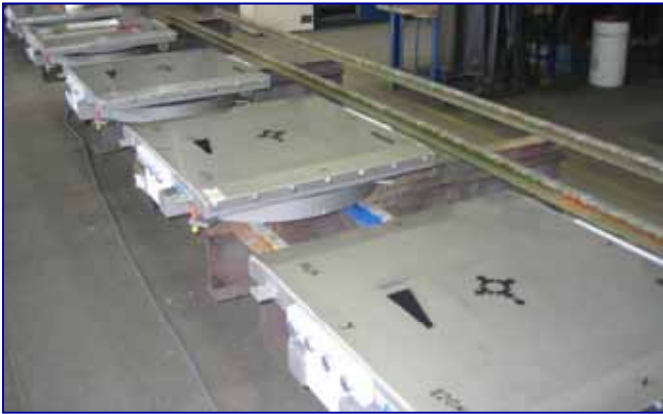


- 가



\varnothing	Shear connector		Recess	
	$\varnothing K$	LK	$\varnothing AK$	TK
22	35	150	150	200



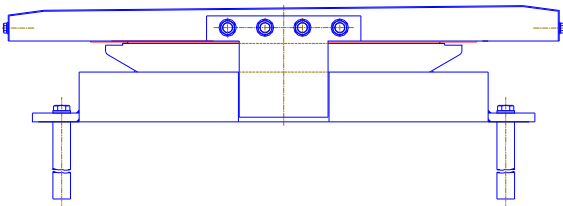


RESTON®SPHERICAL ILM

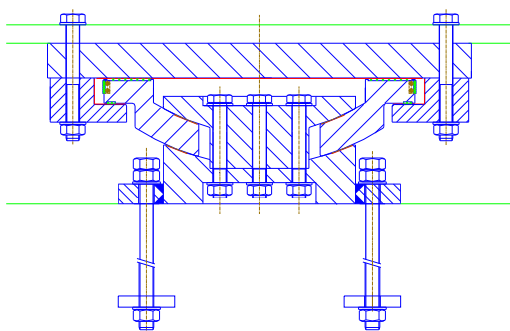
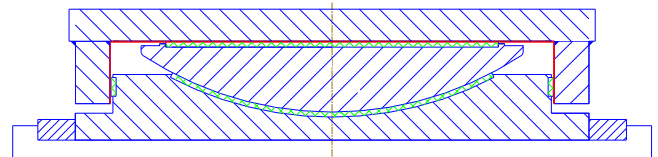
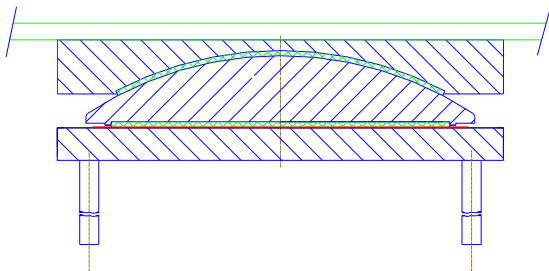
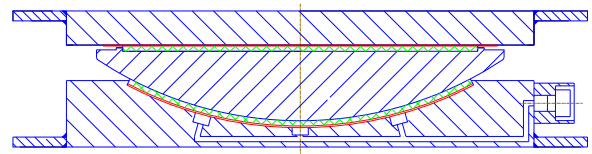
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RESTON®SPHERICAL CONTROL

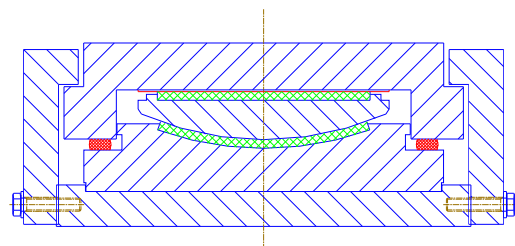
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ILM



가 (uplift)



가 (uplift)

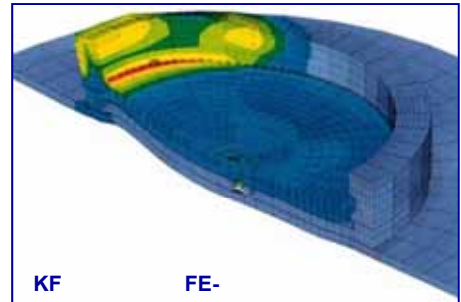
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• ($N_{Sd,max}$, $N_{Sd,min}$, NG_d and NQ_d)
 • (F_{yd} , F_{xd})
 • ()
 • ()

EN 1337, 1, 25-27



가

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