Guidelines and **R**ecommendations for **I**ntegrating **S**pecific **P**rofiled steel sheets in the **E**urocodes (**GRISPE**)

Test report

Curved Profiles

Annex

31.05.2015

Deliverable D 2.3

Guidelines and Recommendations for Integrating Specific Profiled Steels sheets in the Euro-codes (GRISPE)

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Deliverable		
D 2.3 Test report		***Due date: 31th May 2015*** ***Completion date: 31th May 2015***

Content

1 Annex A: Object of testing

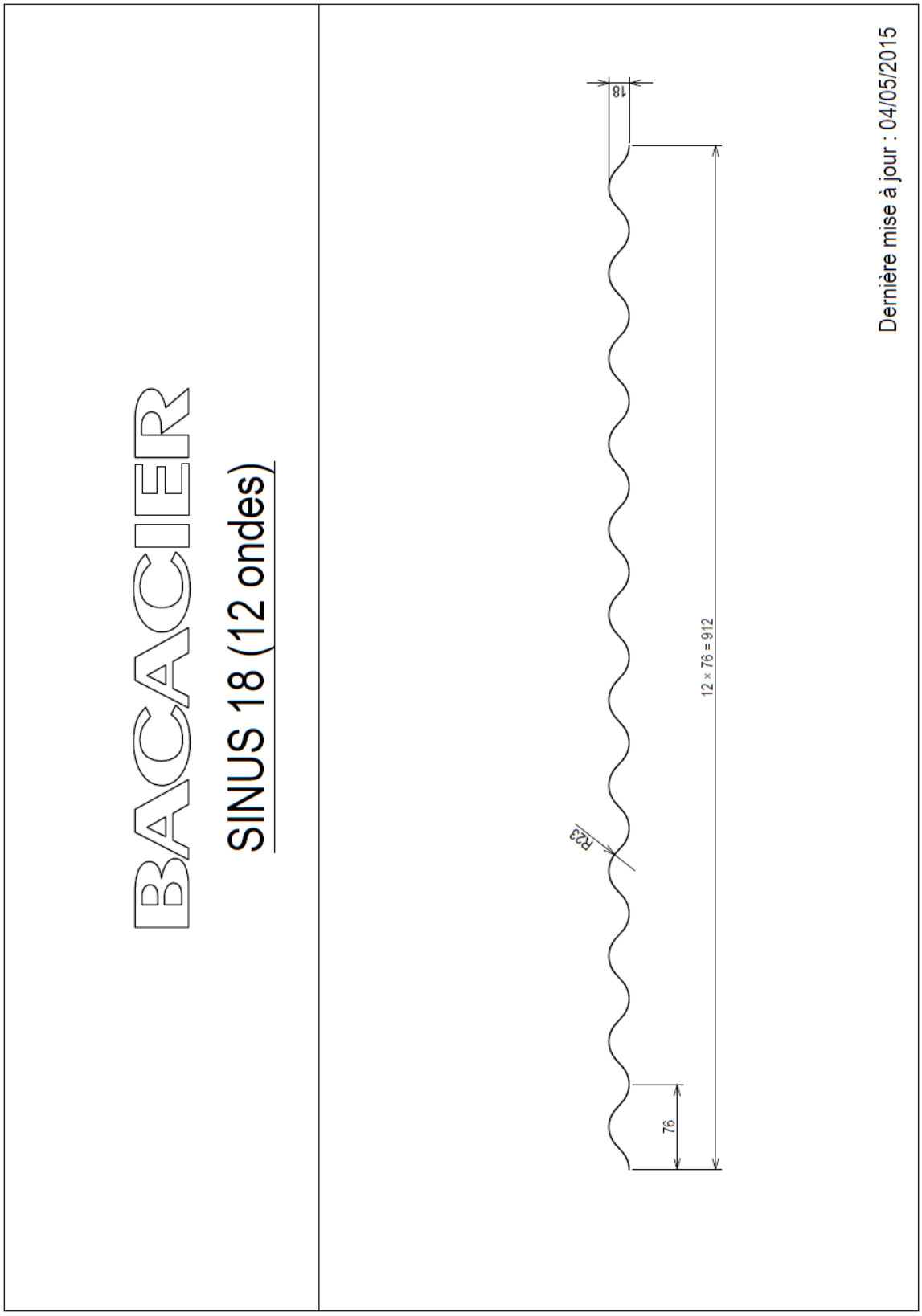


Figure A.1: Cross-section of Bacacier 18/76

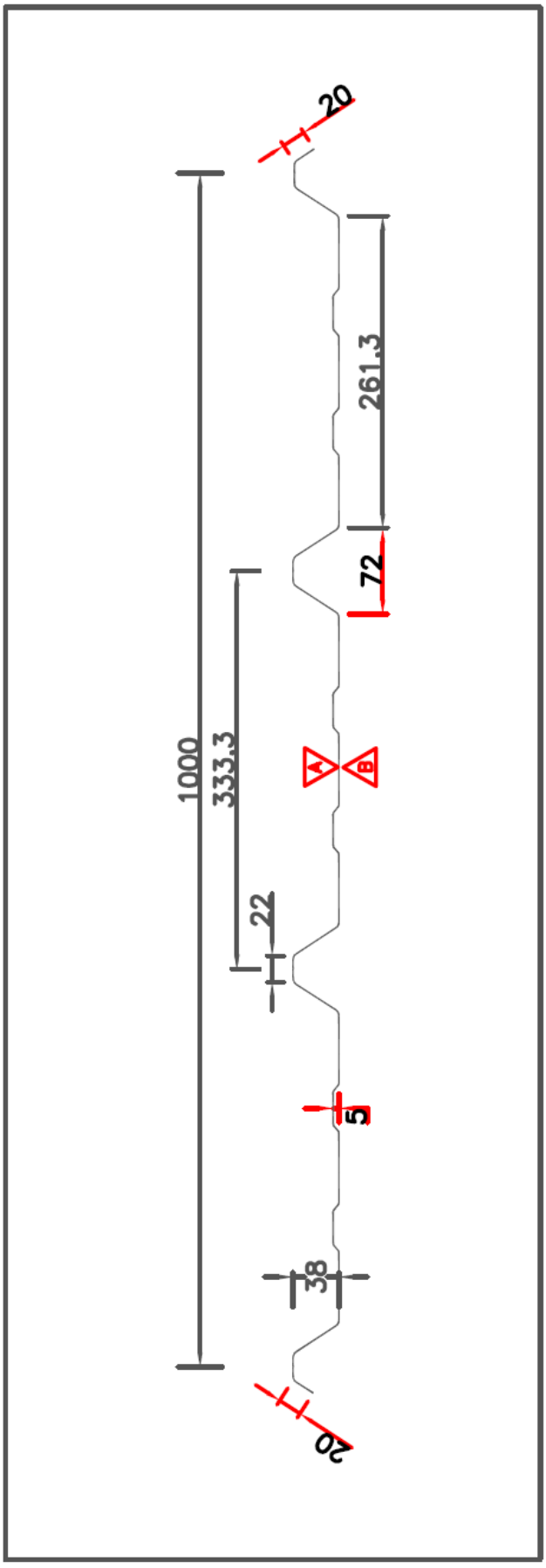


Figure A.2: Cross-section of Bacacier 39/333

2 Annex B: Single span positive bending tests

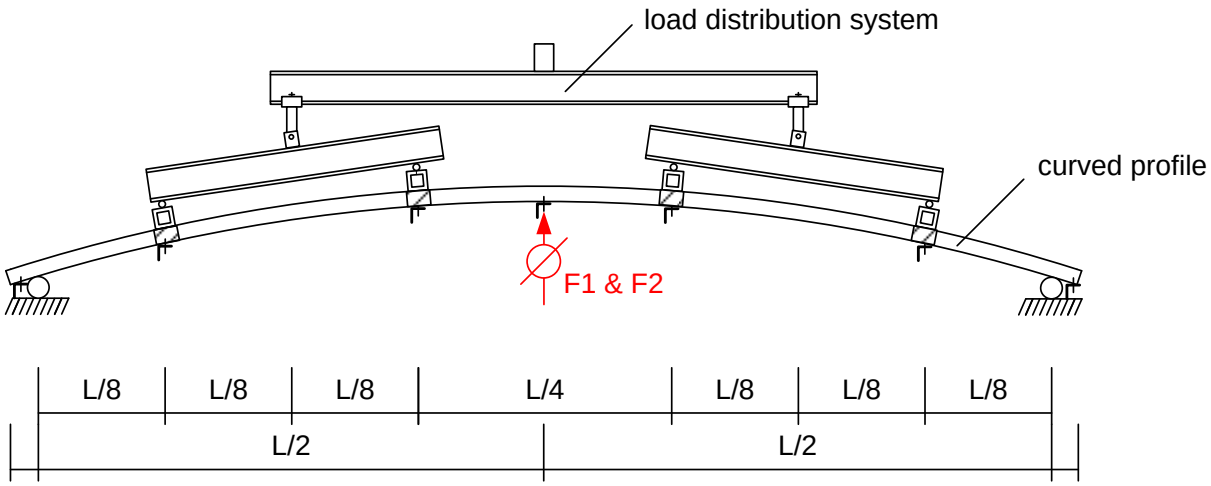


Figure B.1: Schematic test setup

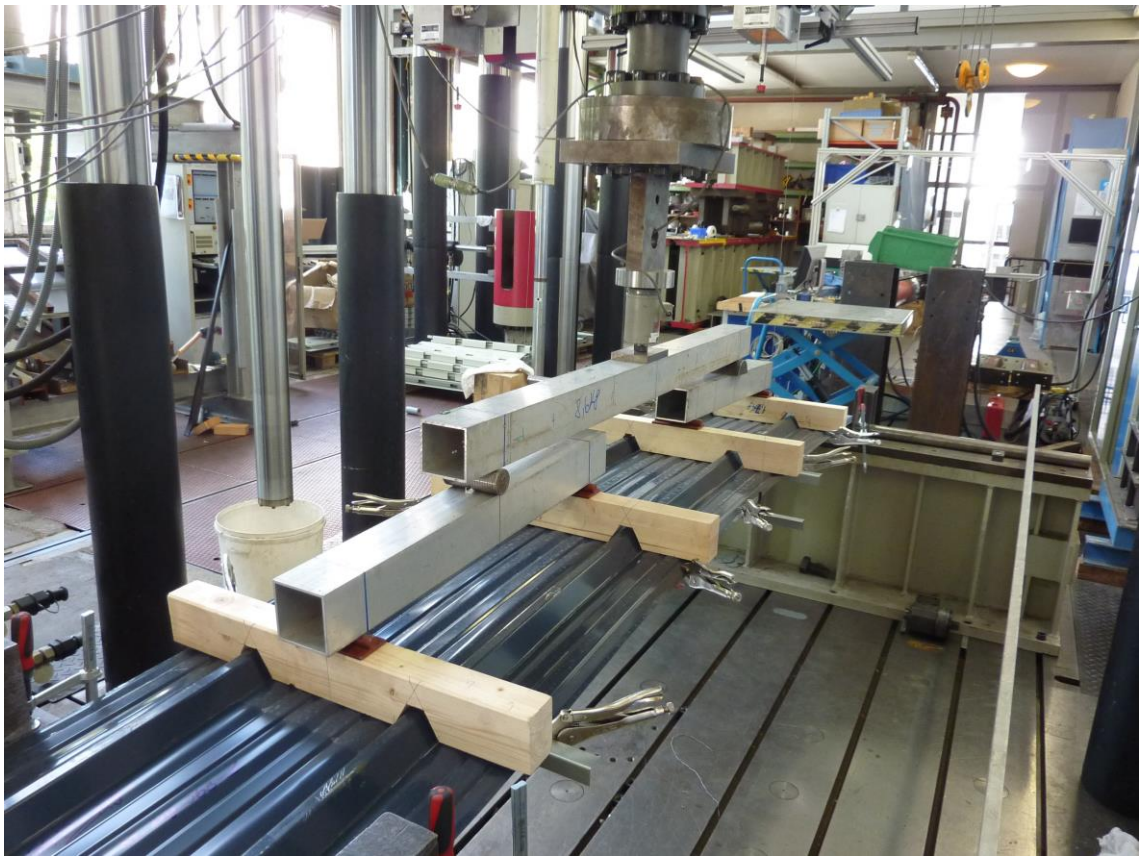


Figure B.2: Test setup for flat and profiles, side view, profile 39/333

Figure B.3: Test setup for flat profiles, side view, profile 18/76

Figure B.4: Test setup for curved profiles, side view, exemplary for profile 18/76

Figure B.5: Test setup for curved profiles, side view, exemplary for profile 39/333

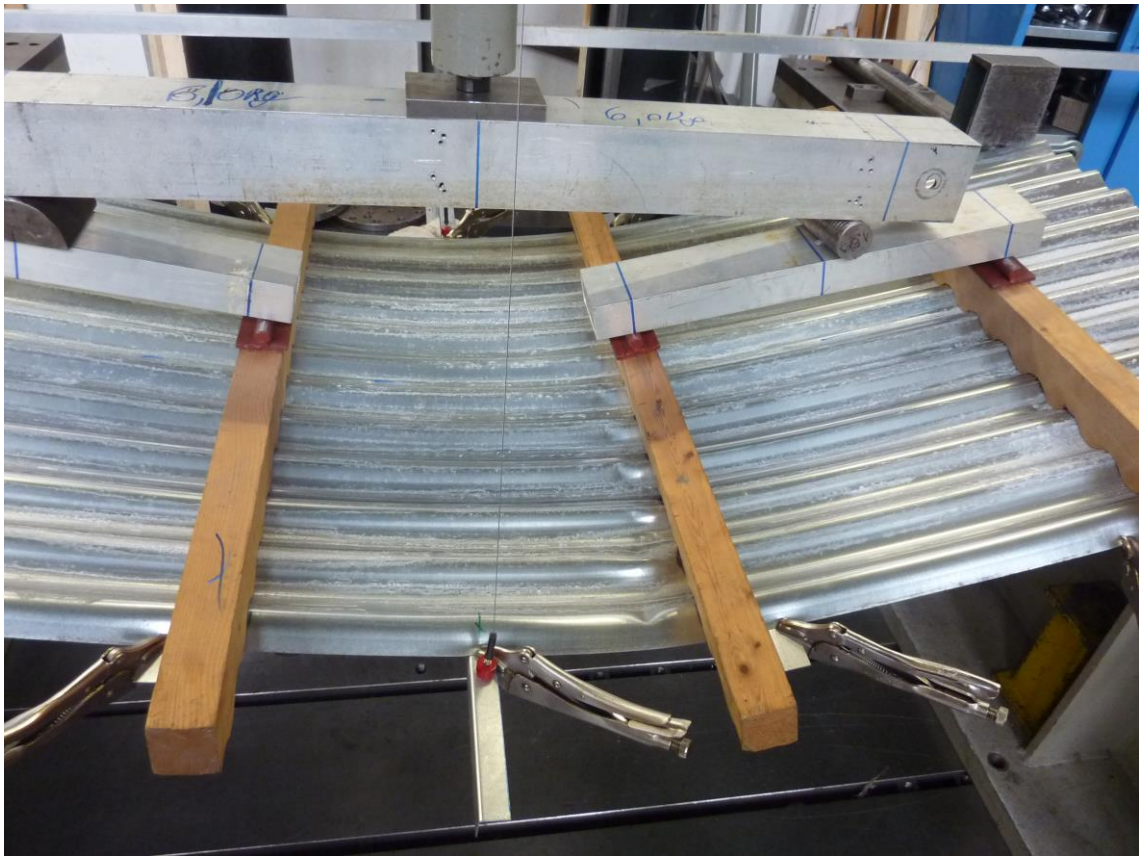


Figure B.6: Failure mode (local buckling) of profile 18/76 t_N = 0.63 mm

Figure B.7: Failure mode (plastic deformation) of profile 18/76 t_N = 1.00 mm

Figure B.8: Inclined position of load distribution beam of profile 18/76 t_N = 1.00 mm

Figure B.9: Failure mode (plastic deformation) of profile 18/76 t_N = 1.00 mm with arch stitch h = 334 mm

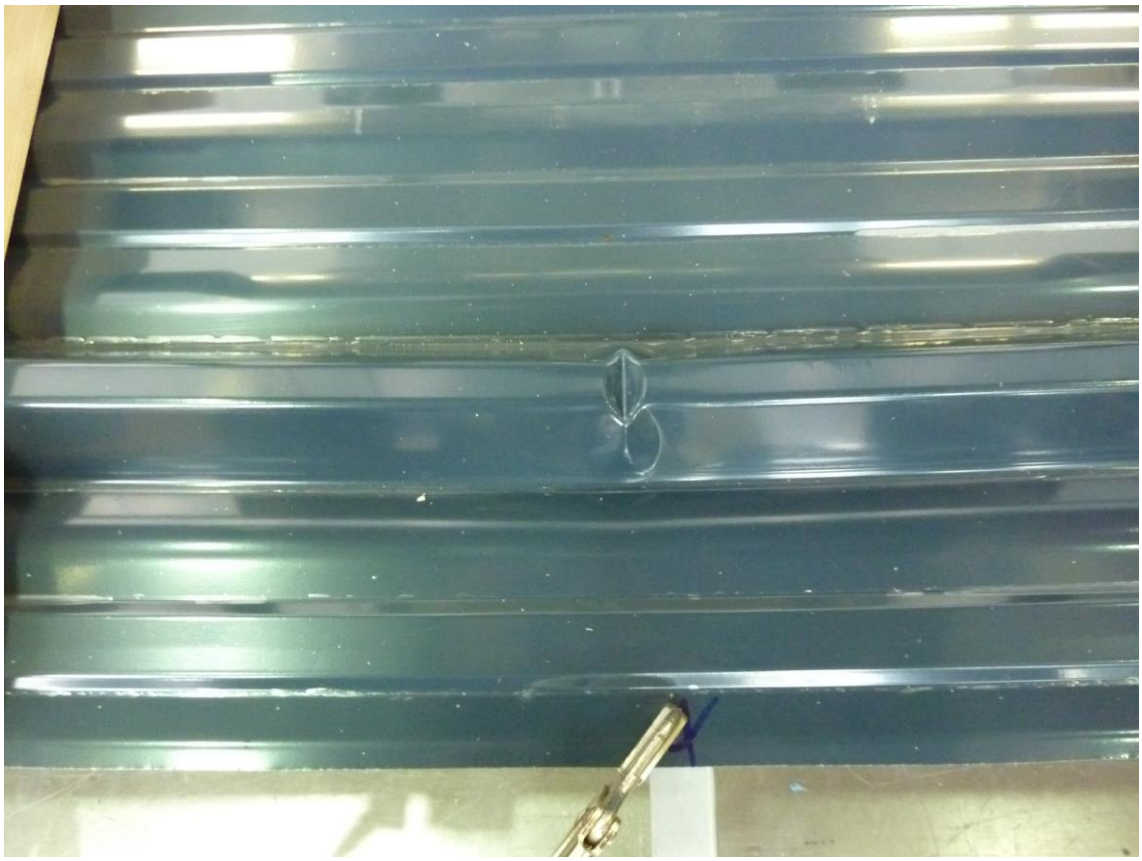


Figure B.10: Failure mode (local buckling of the upper flange) of profile 39/333

Figure B.10: Failure mode (local buckling of the upper flange) of profile 39/333 with arch stitch h = 217 mm

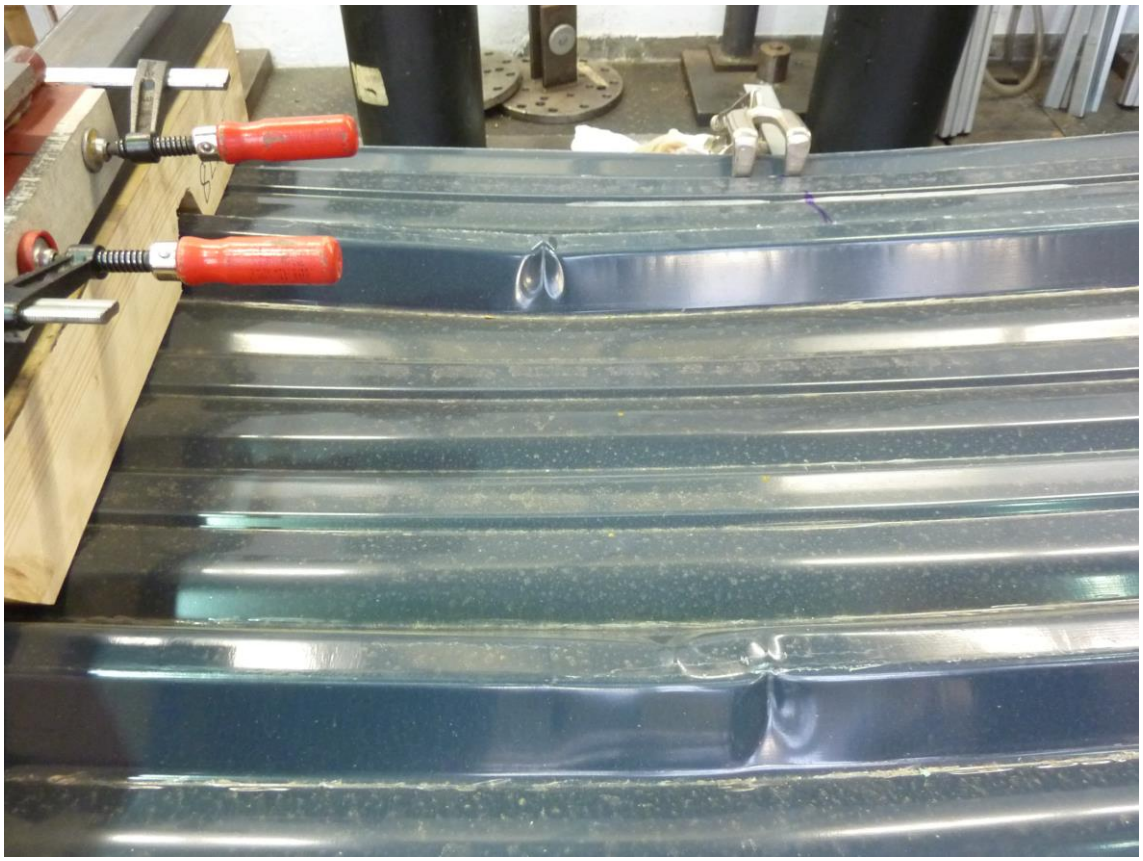


Figure B.11: Failure mode (local buckling of the upper flange), detailed view

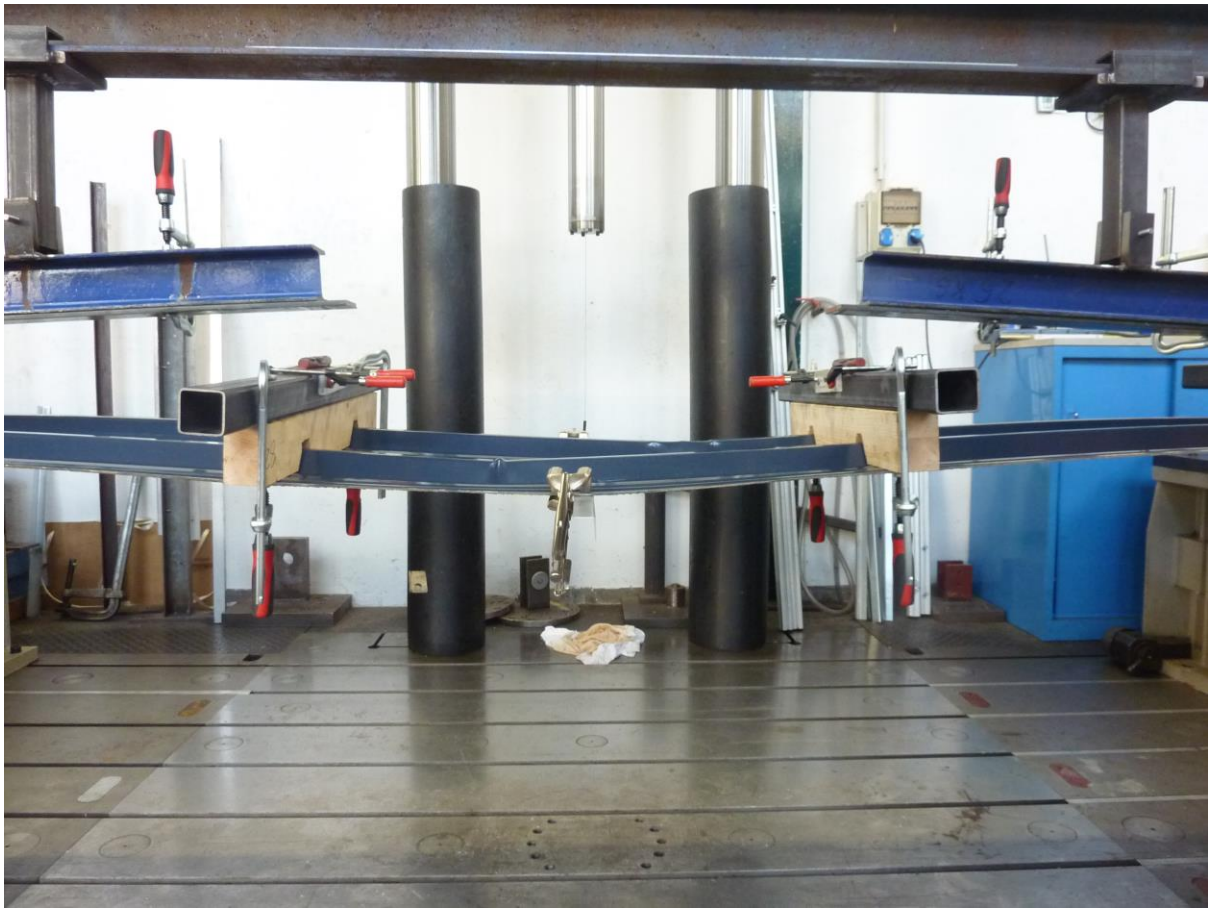
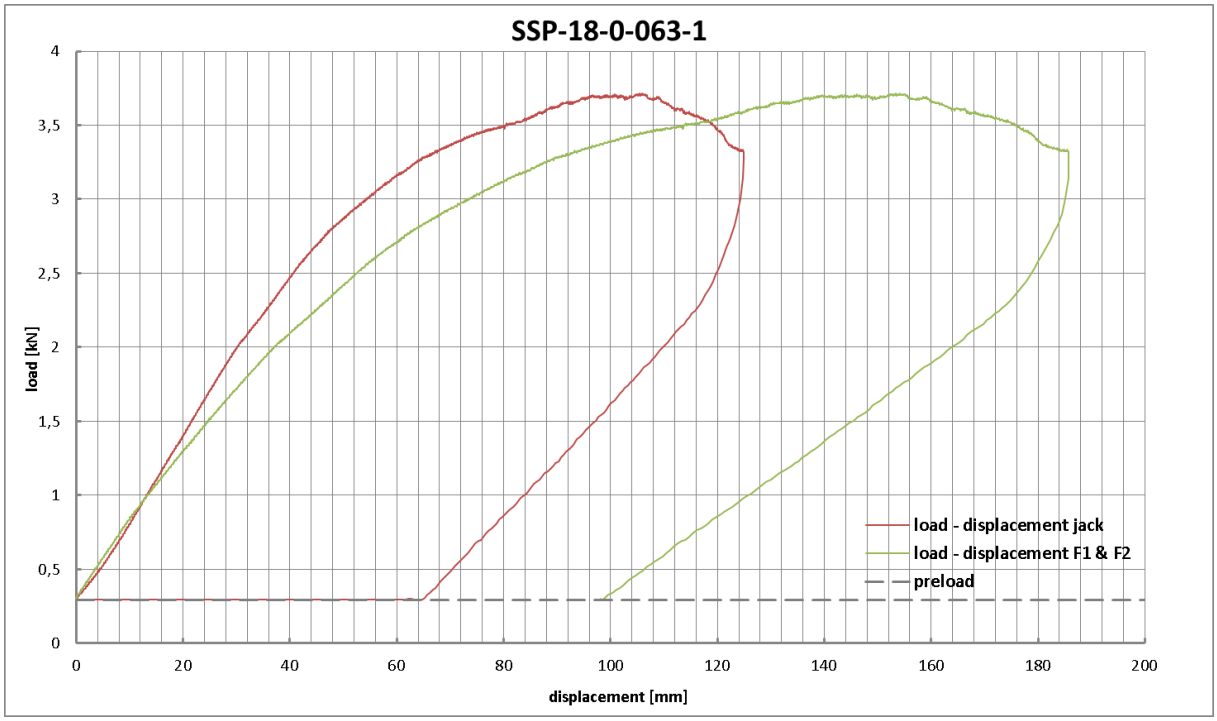
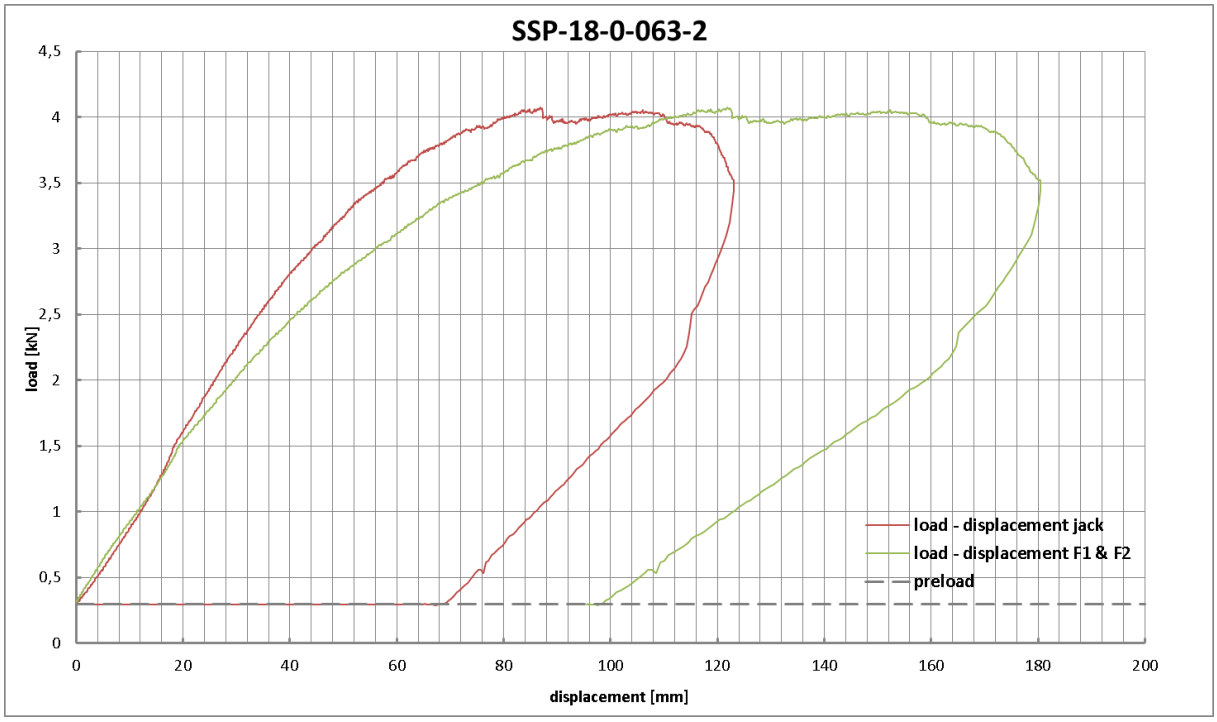


Figure B.12: Failure mode (local buckling of the upper flange) of profile 39/333 with arch stitch h = 380 mm

Load-deflection curves:

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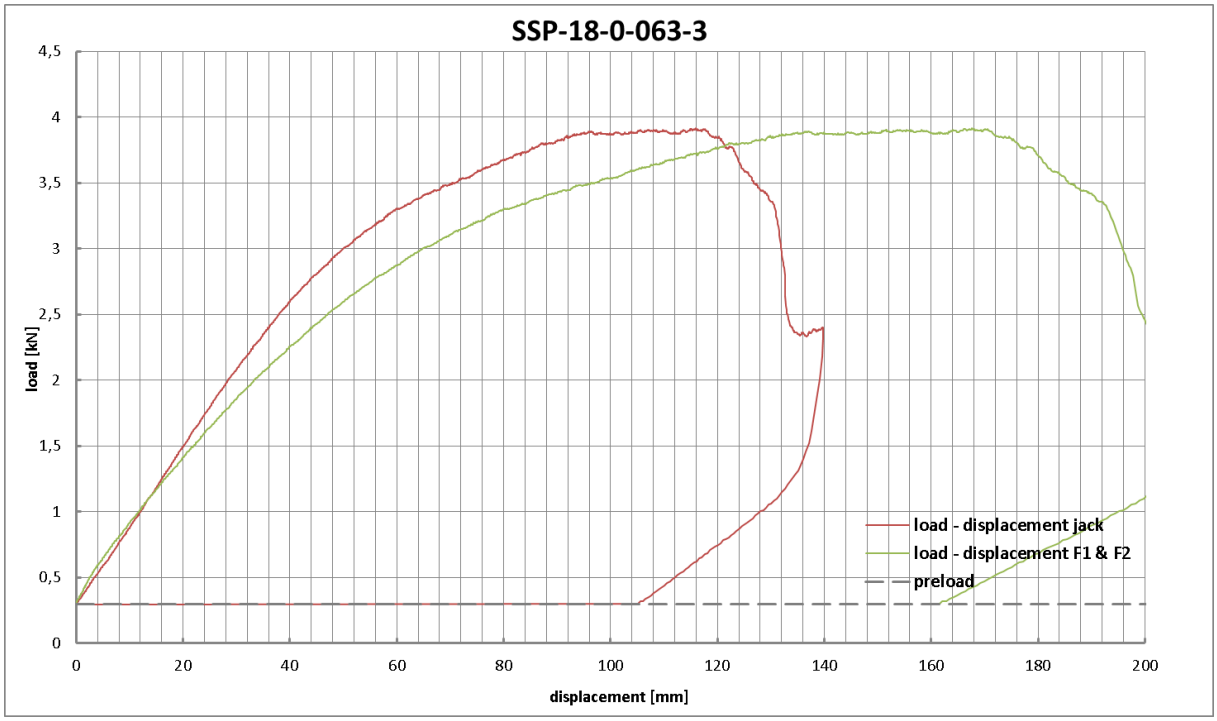
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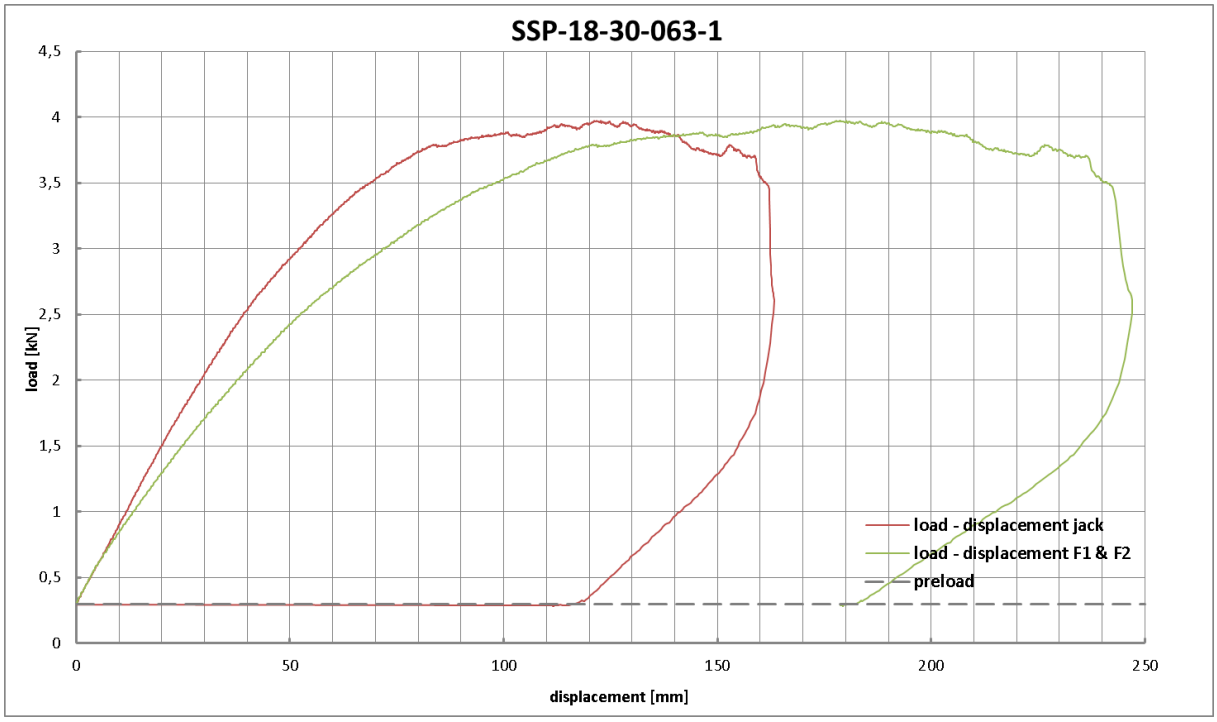
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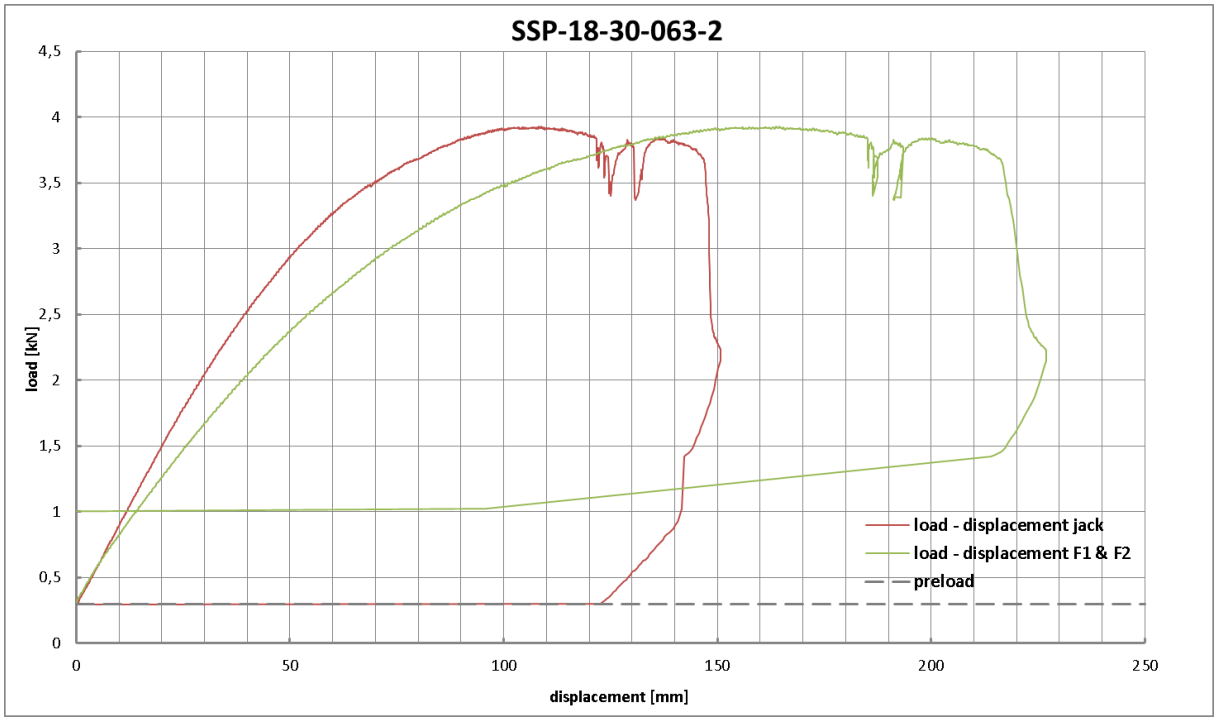
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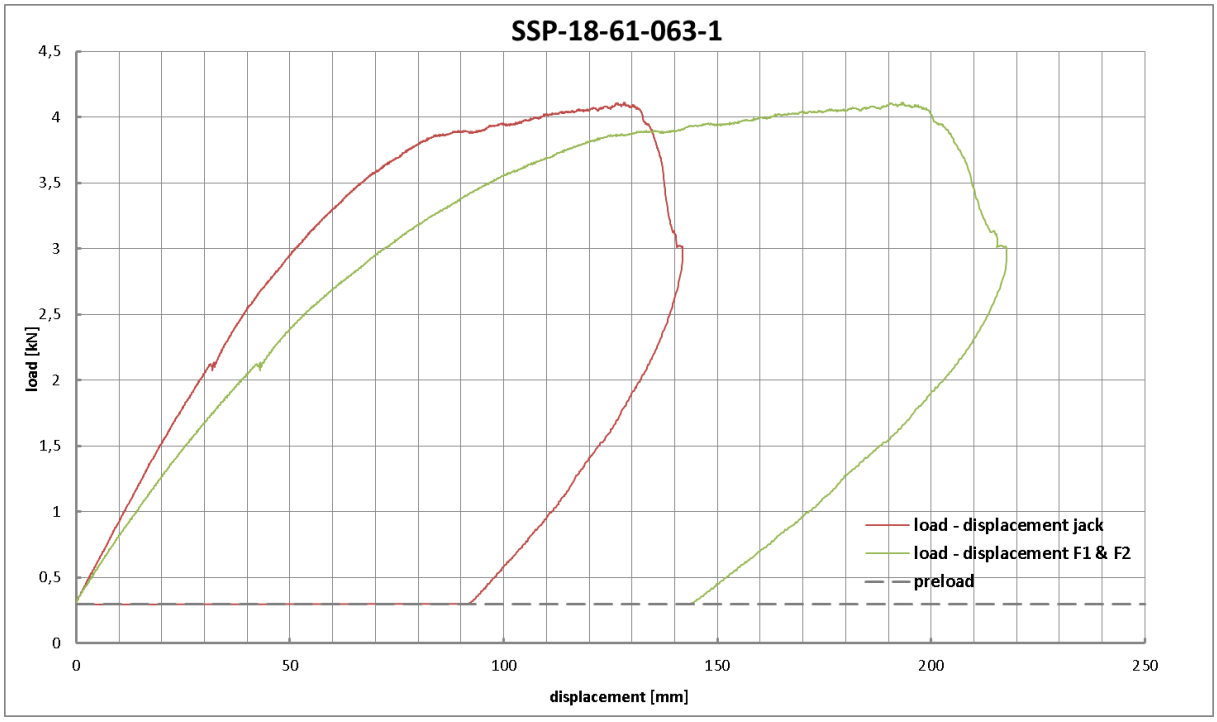
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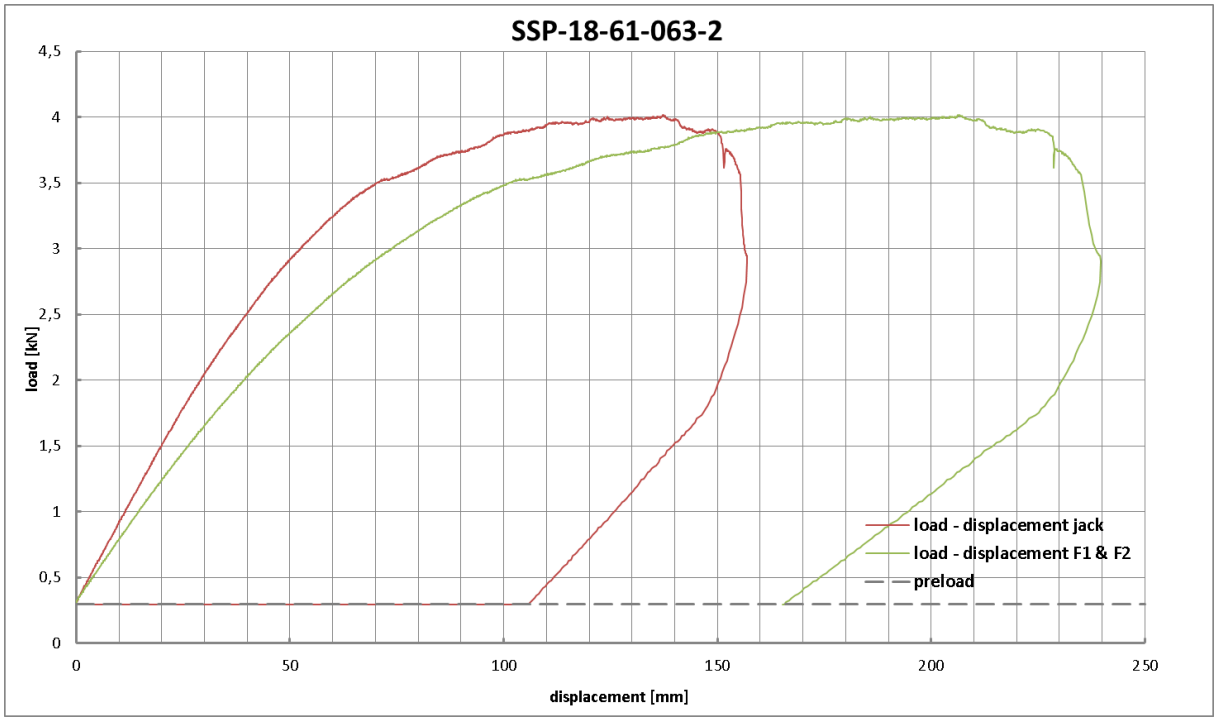
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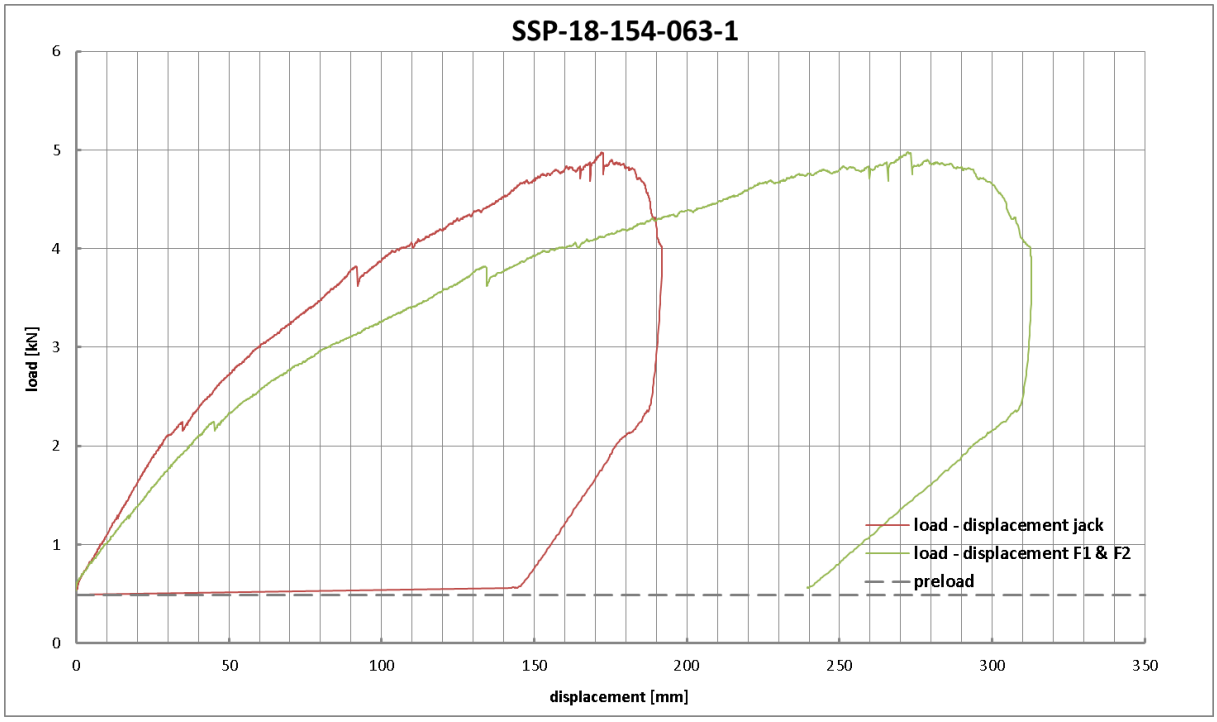
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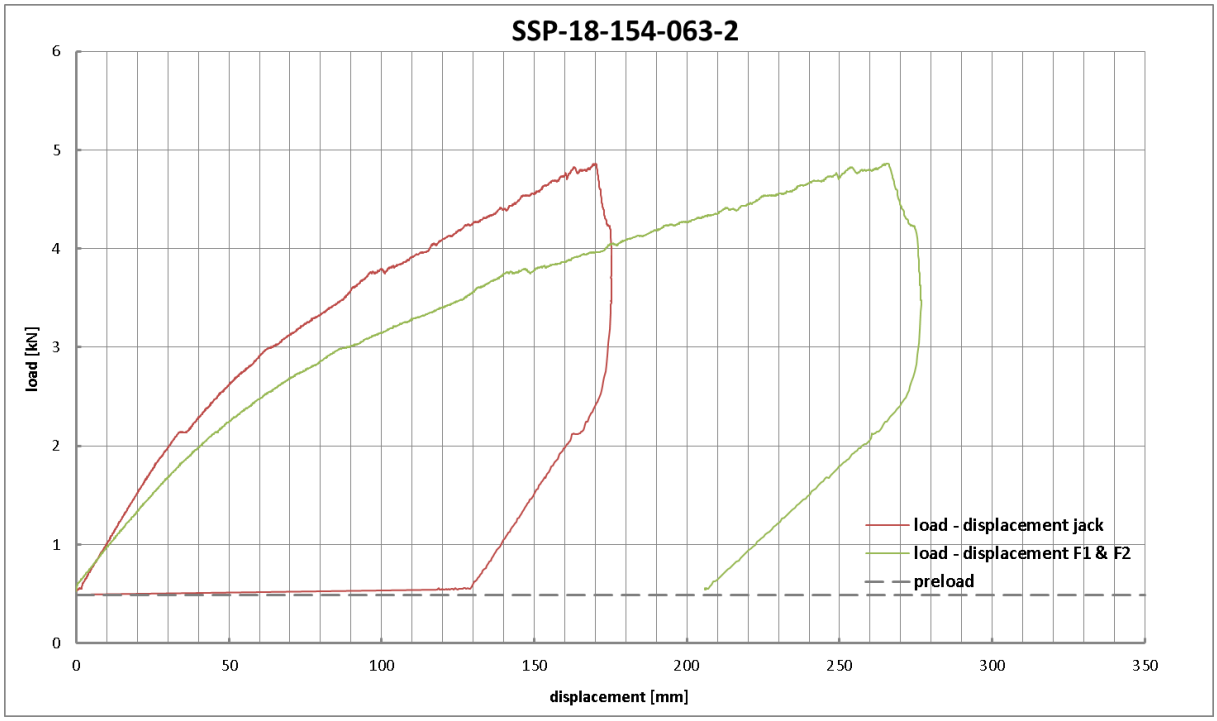
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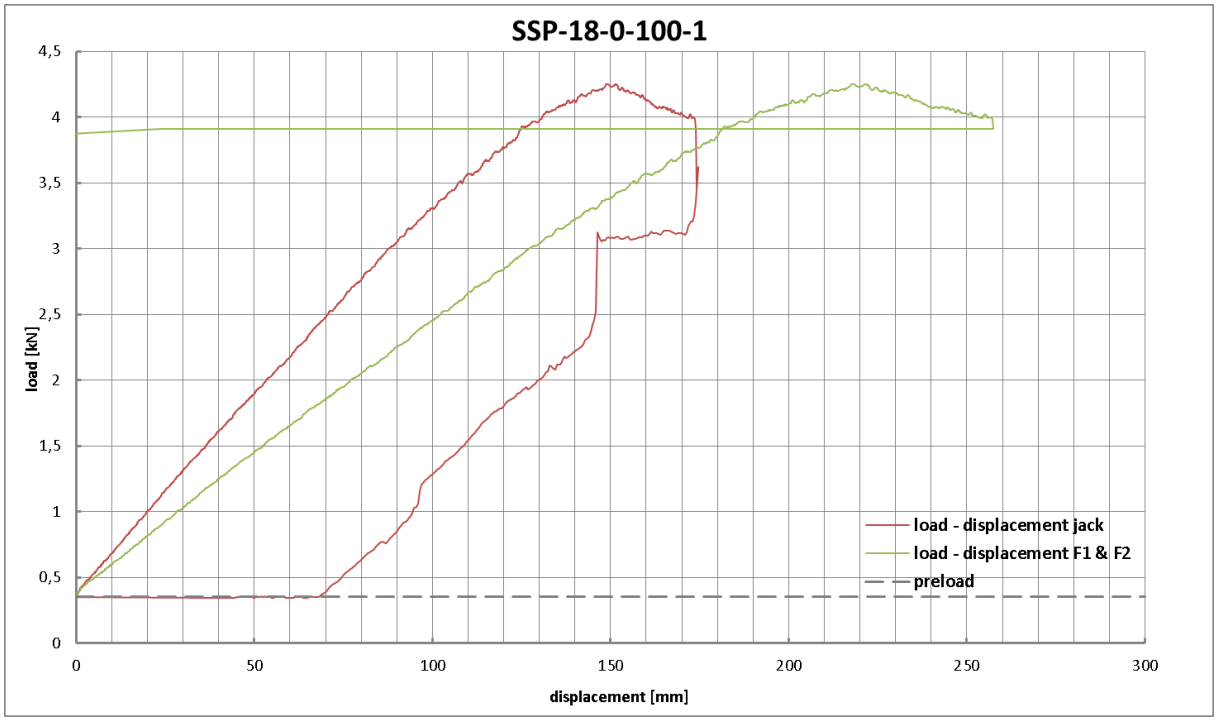
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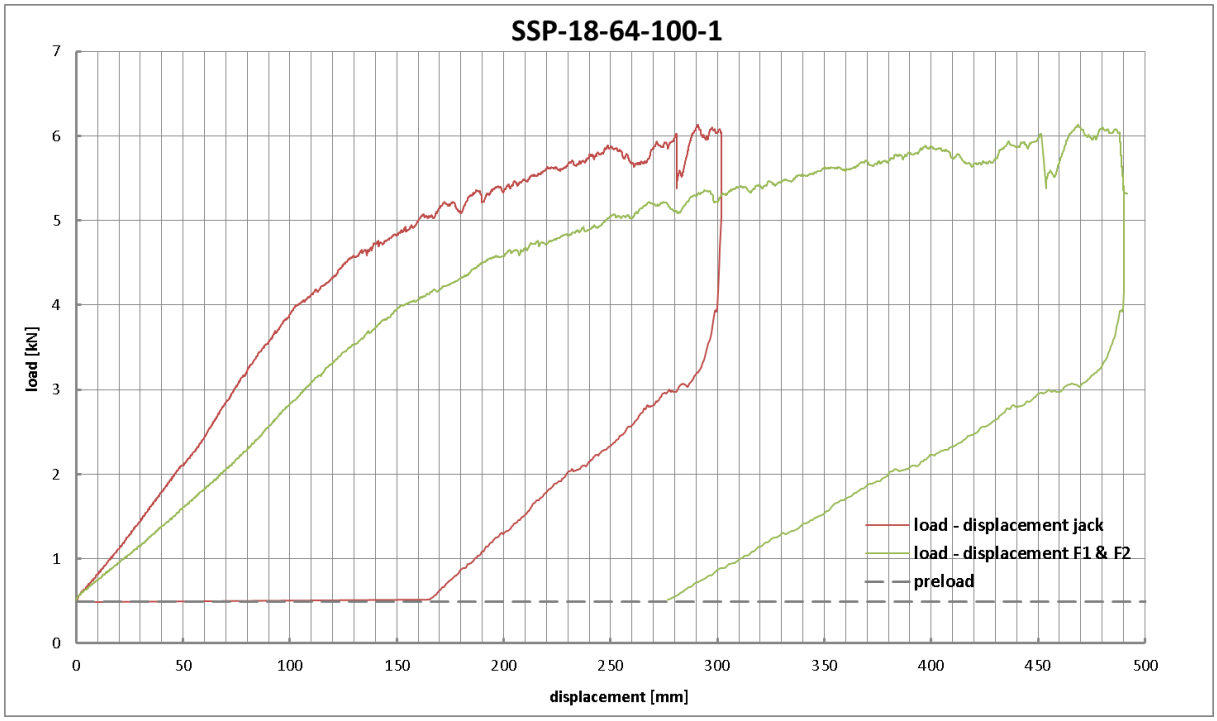
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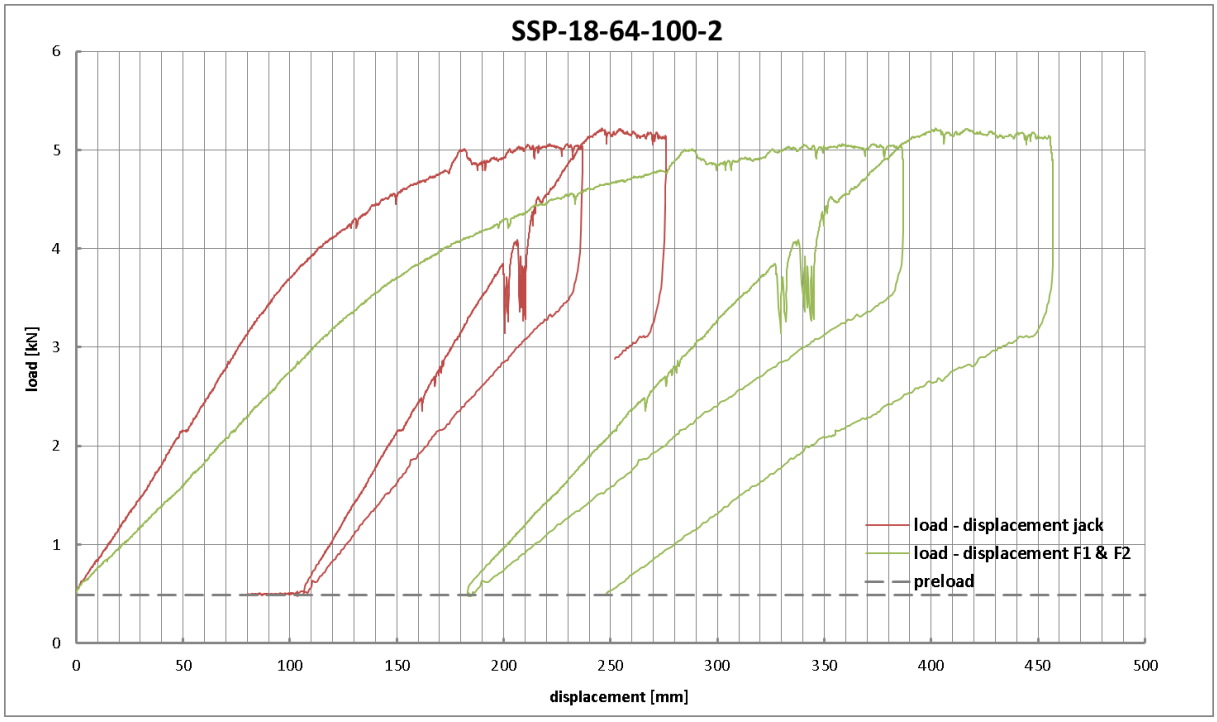
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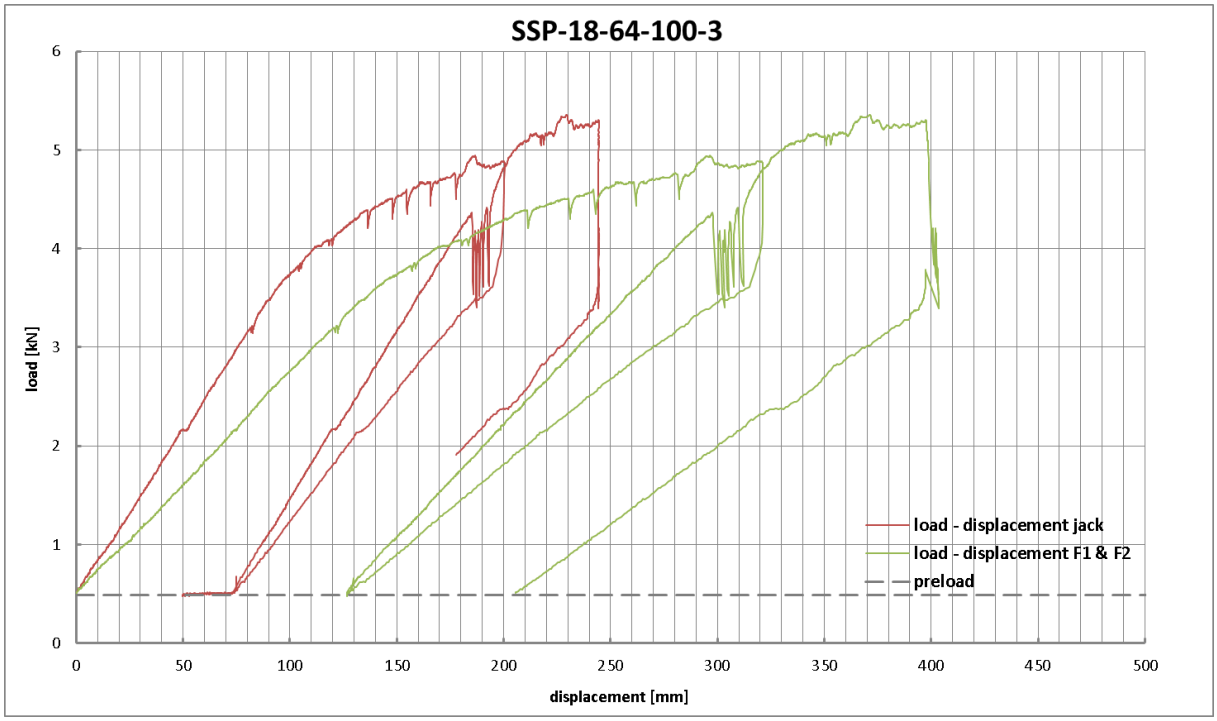
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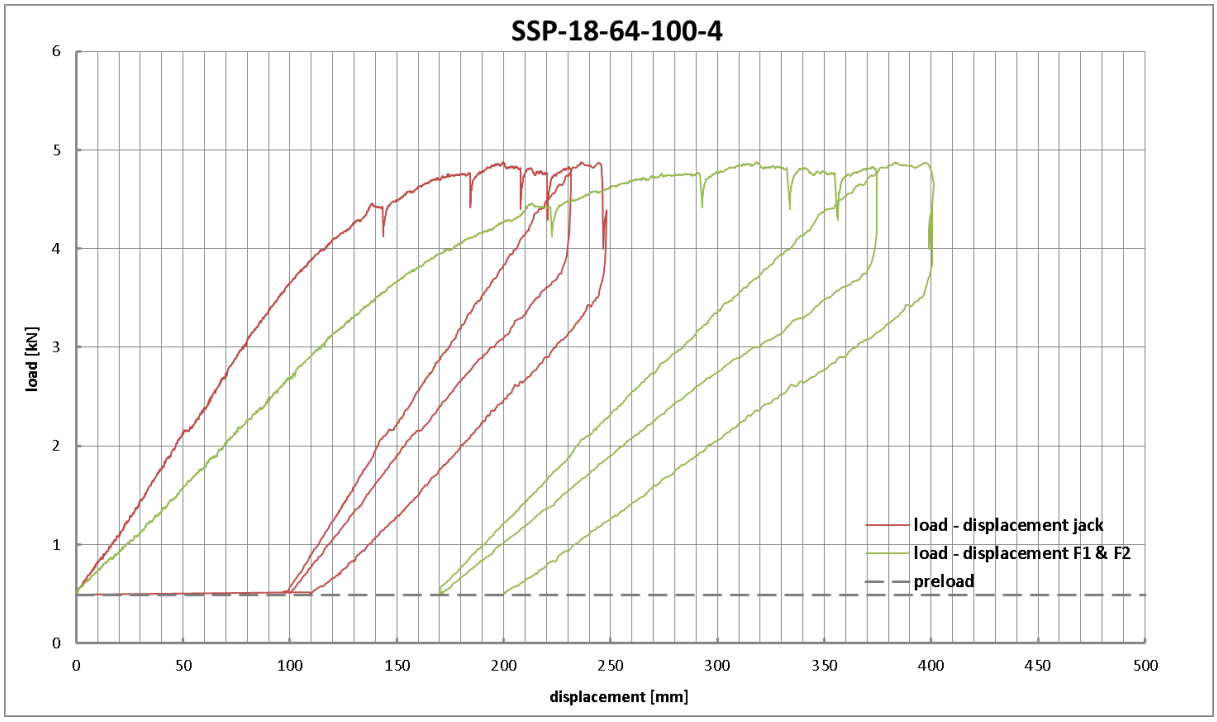
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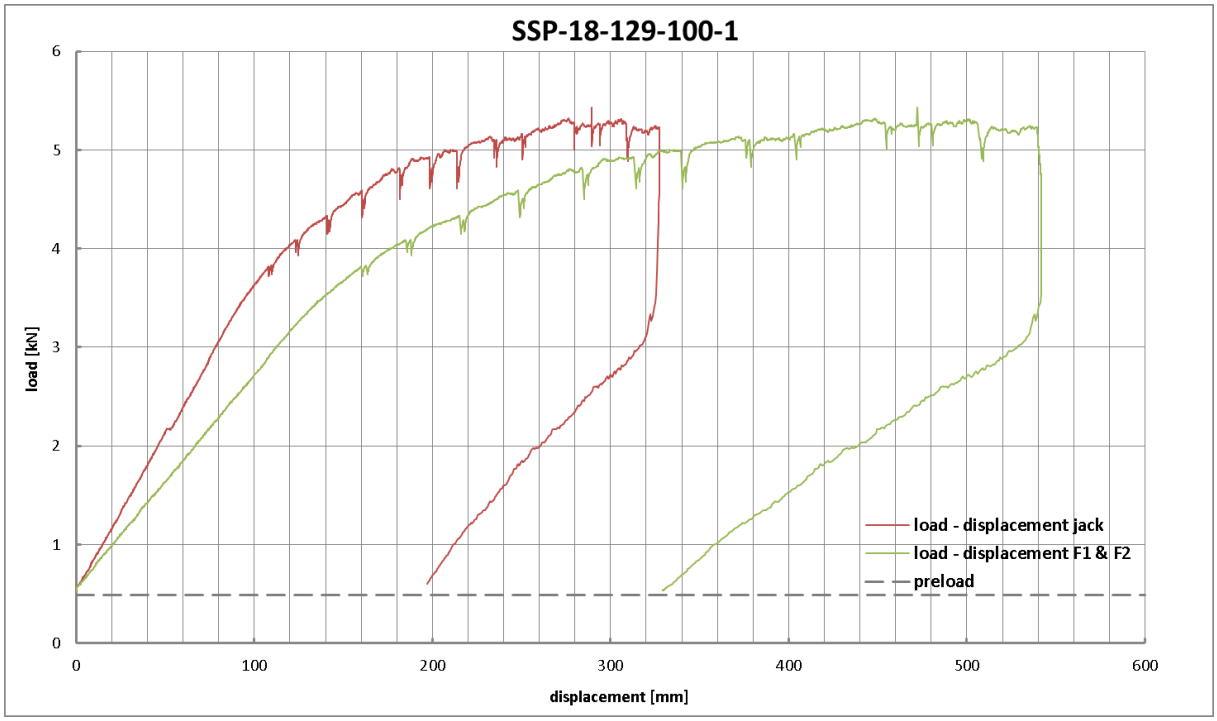
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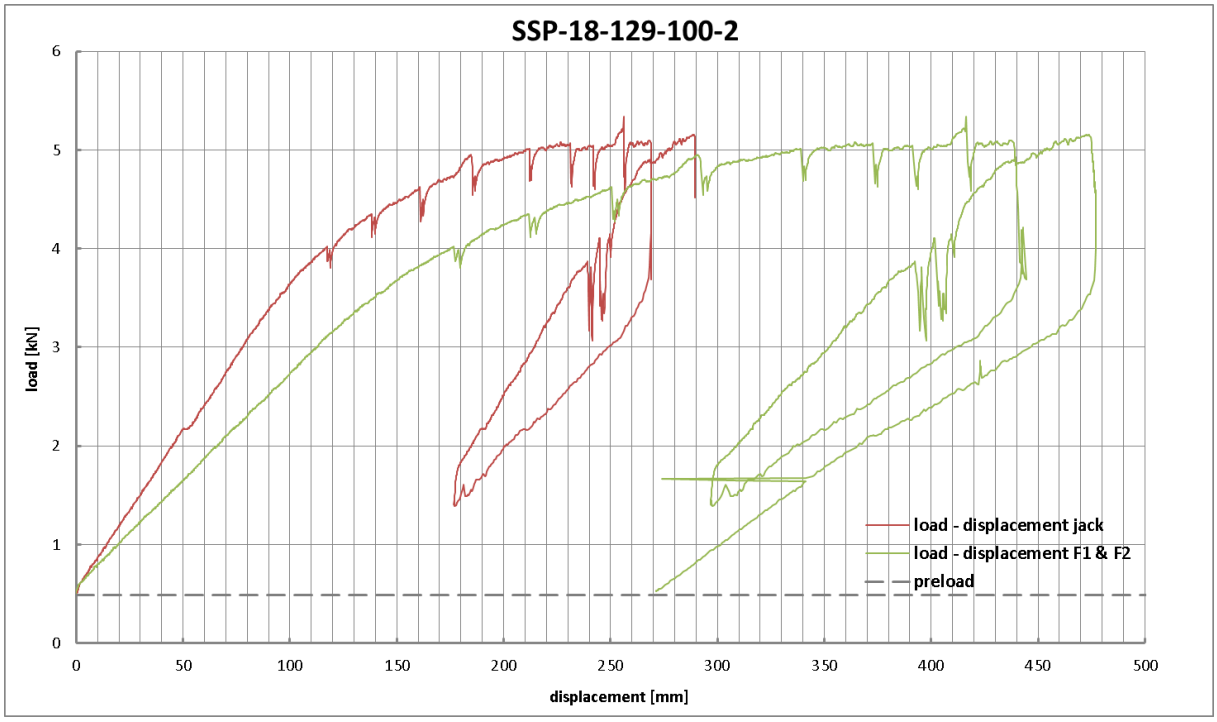
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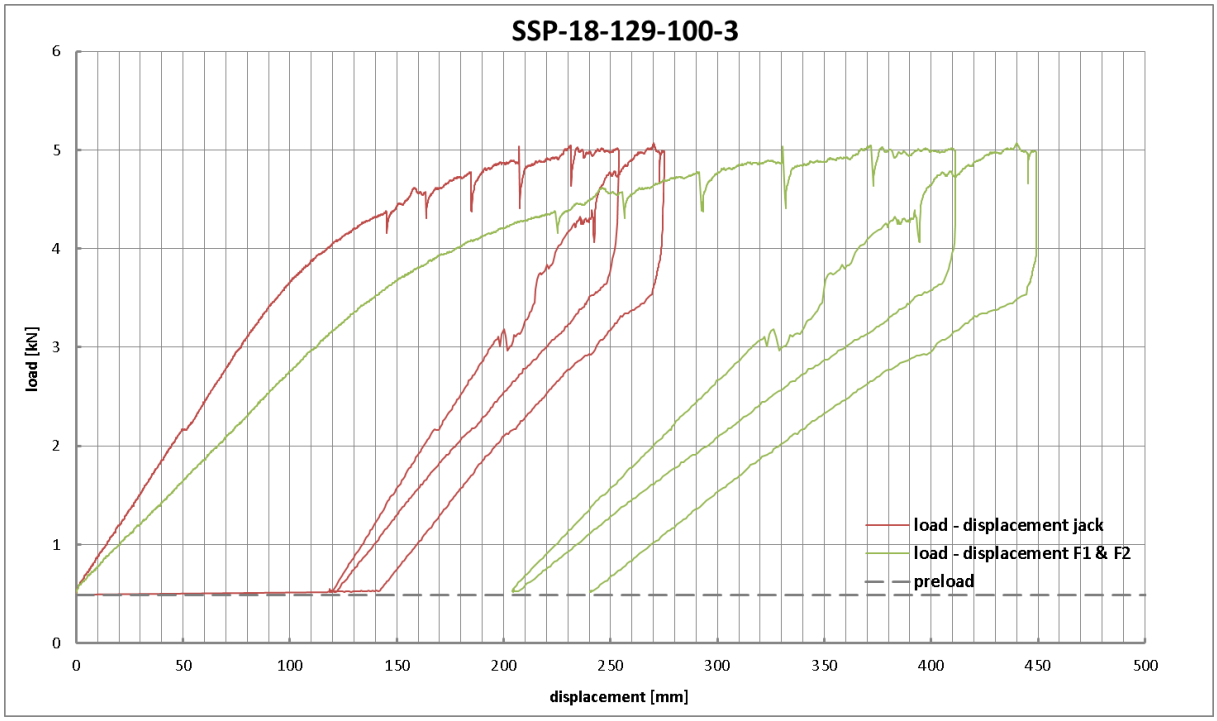
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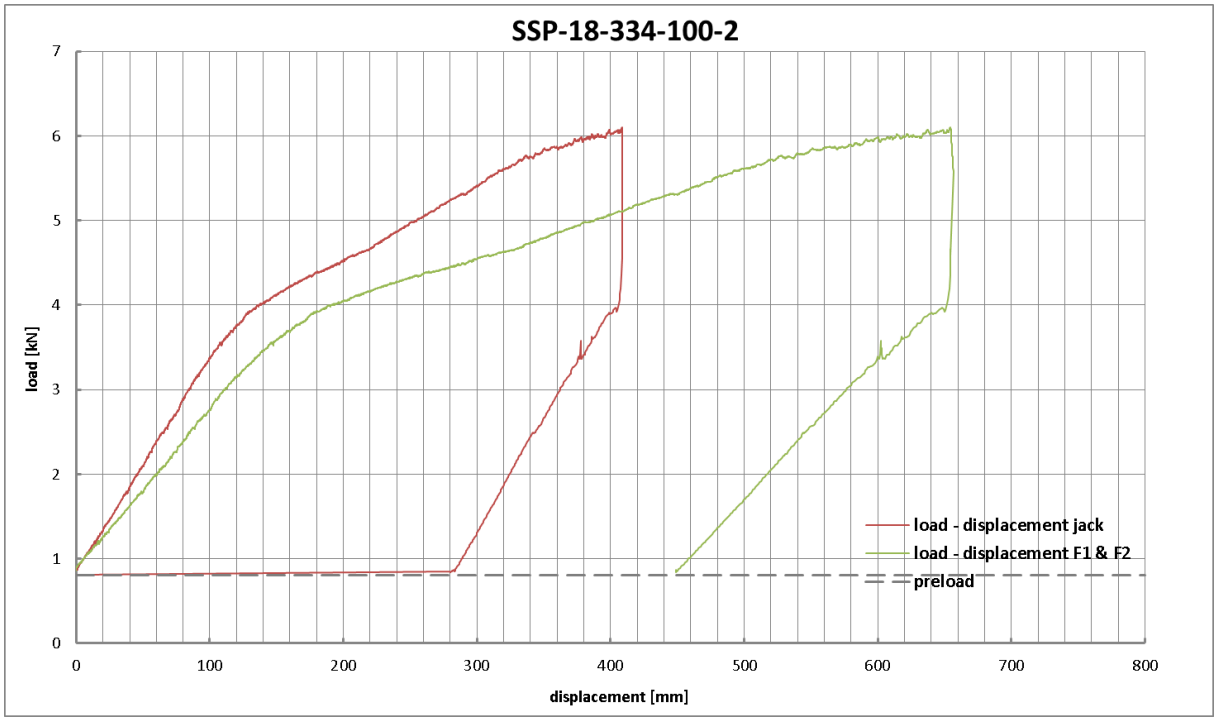
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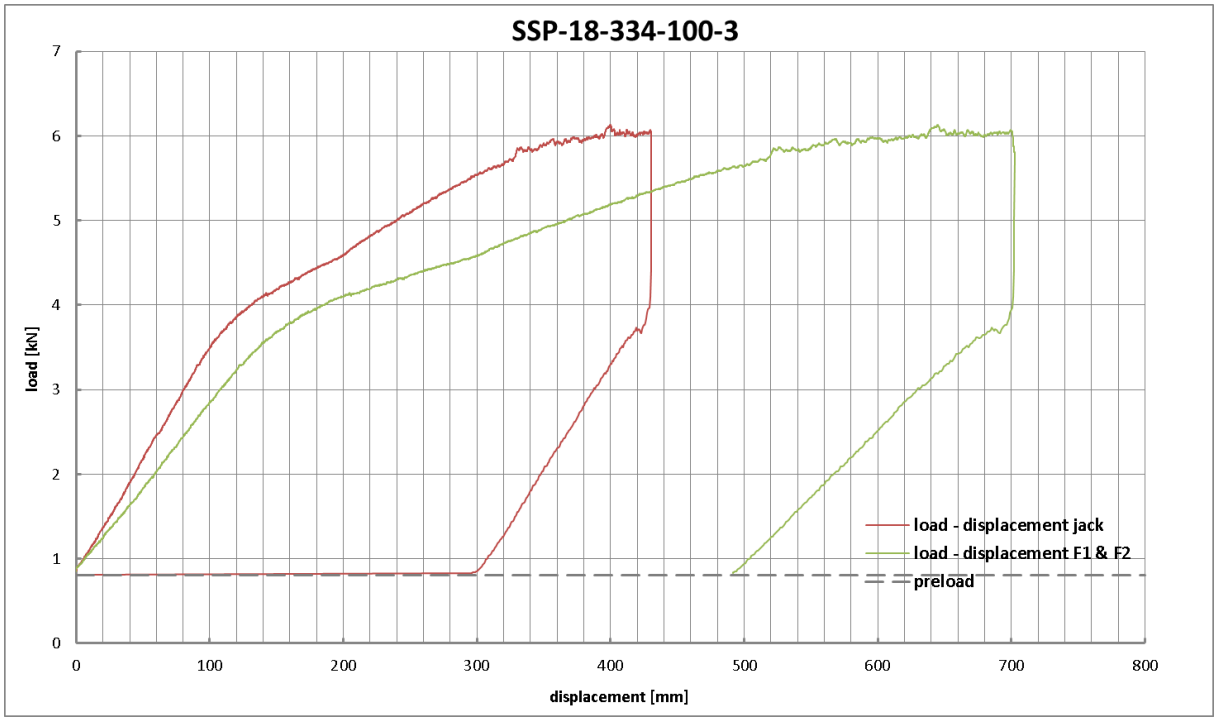
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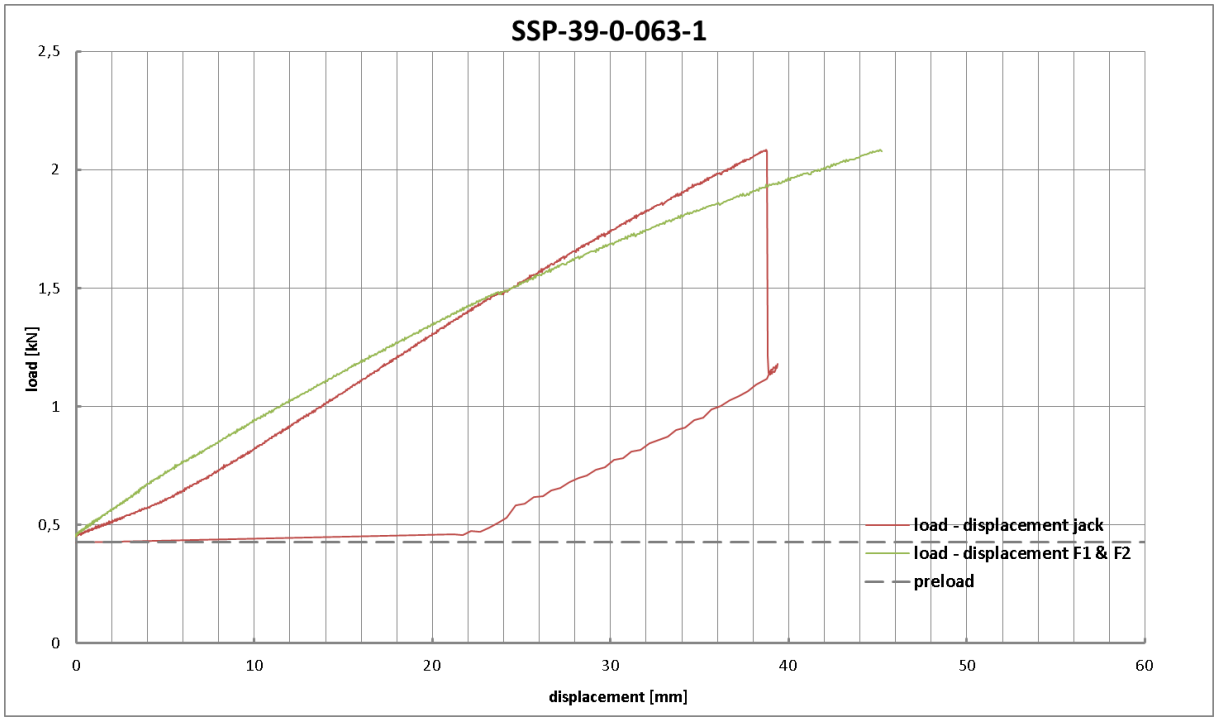
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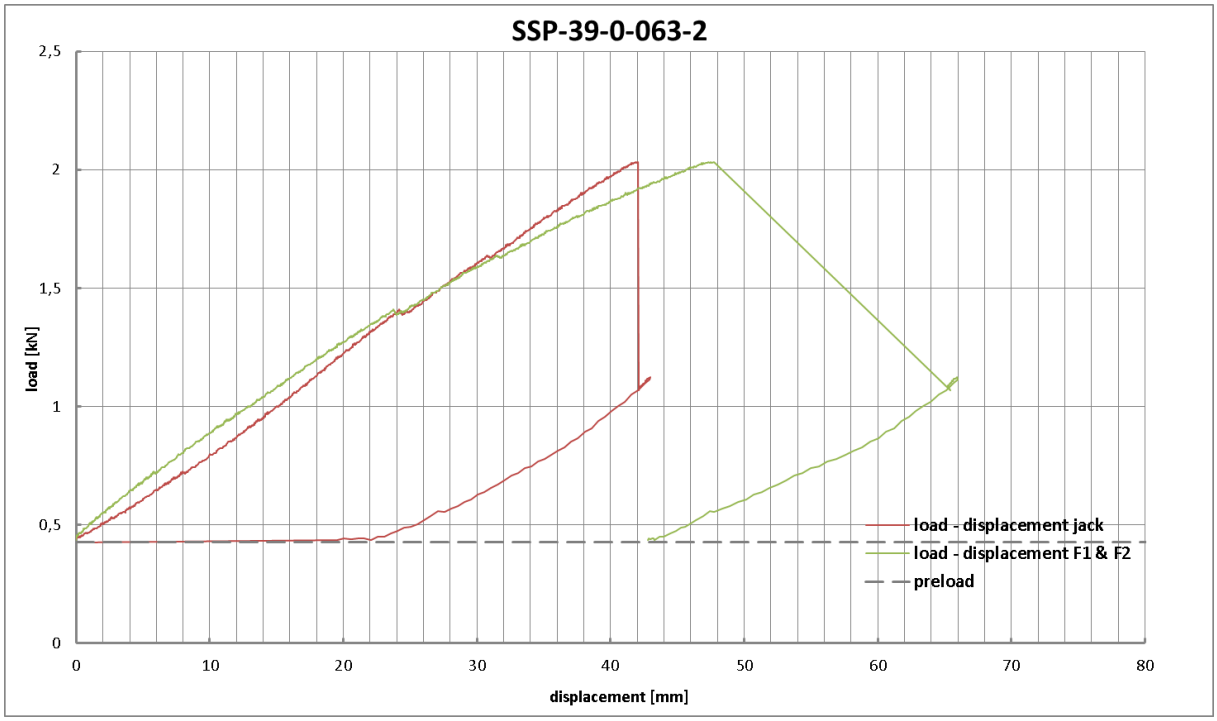
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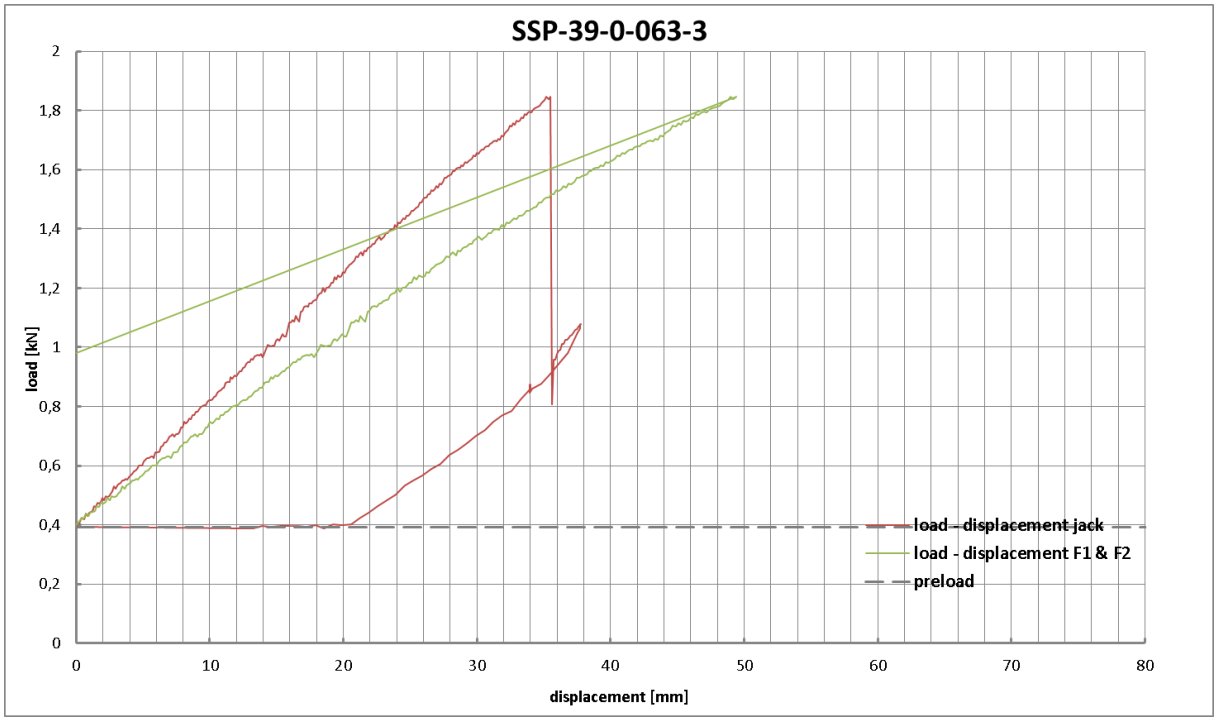
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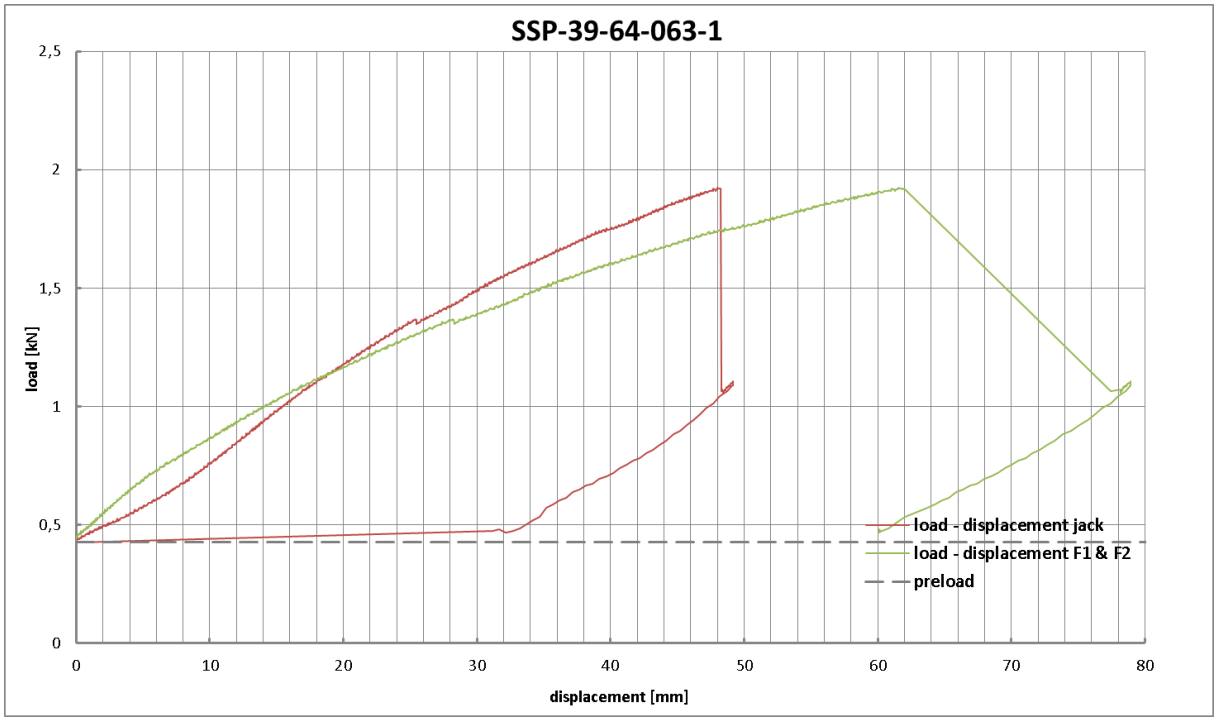
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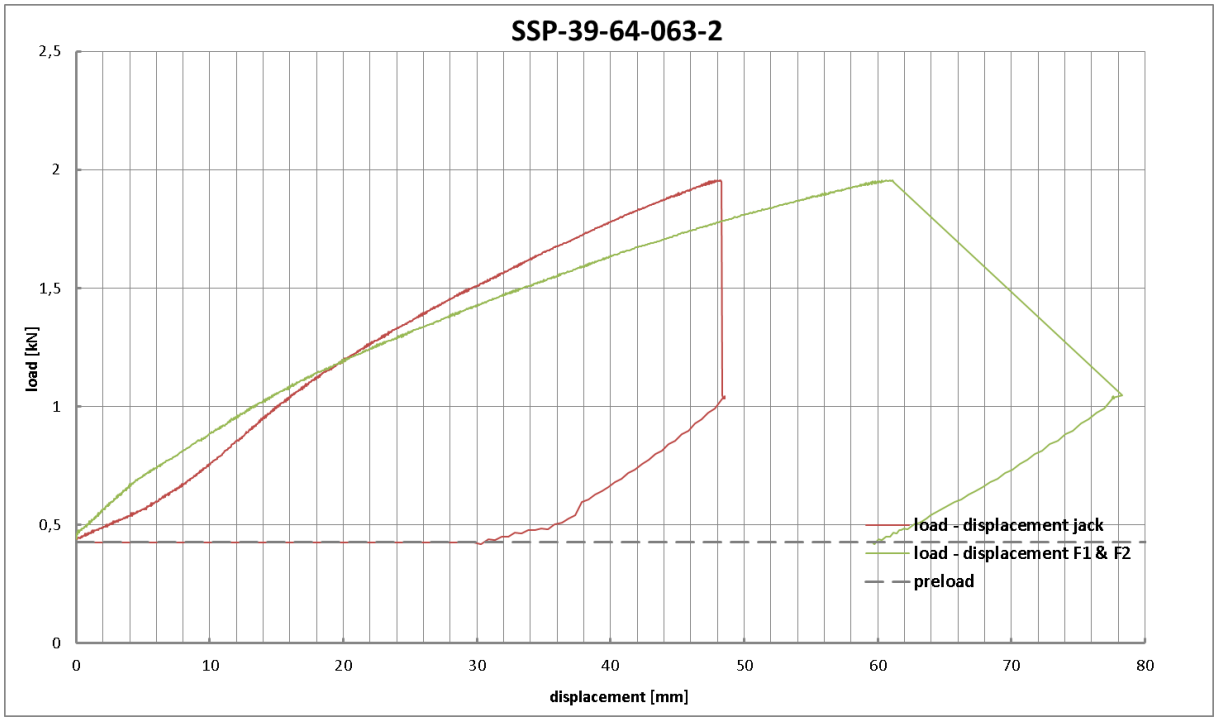
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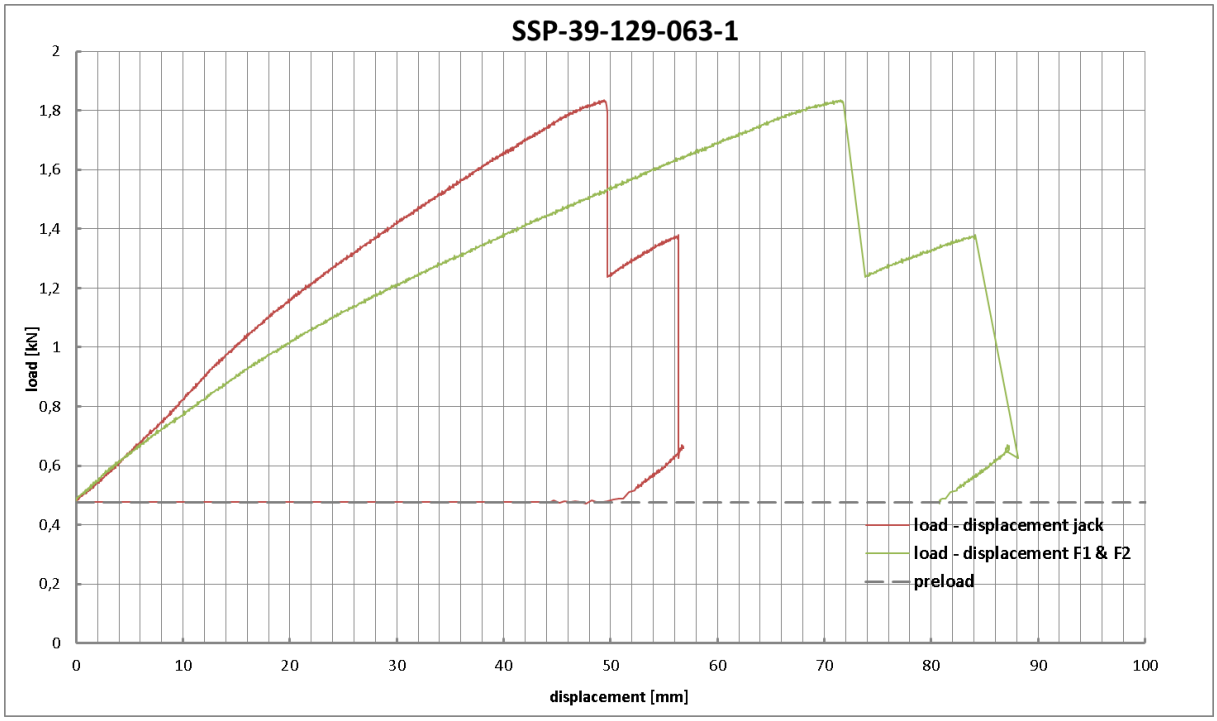
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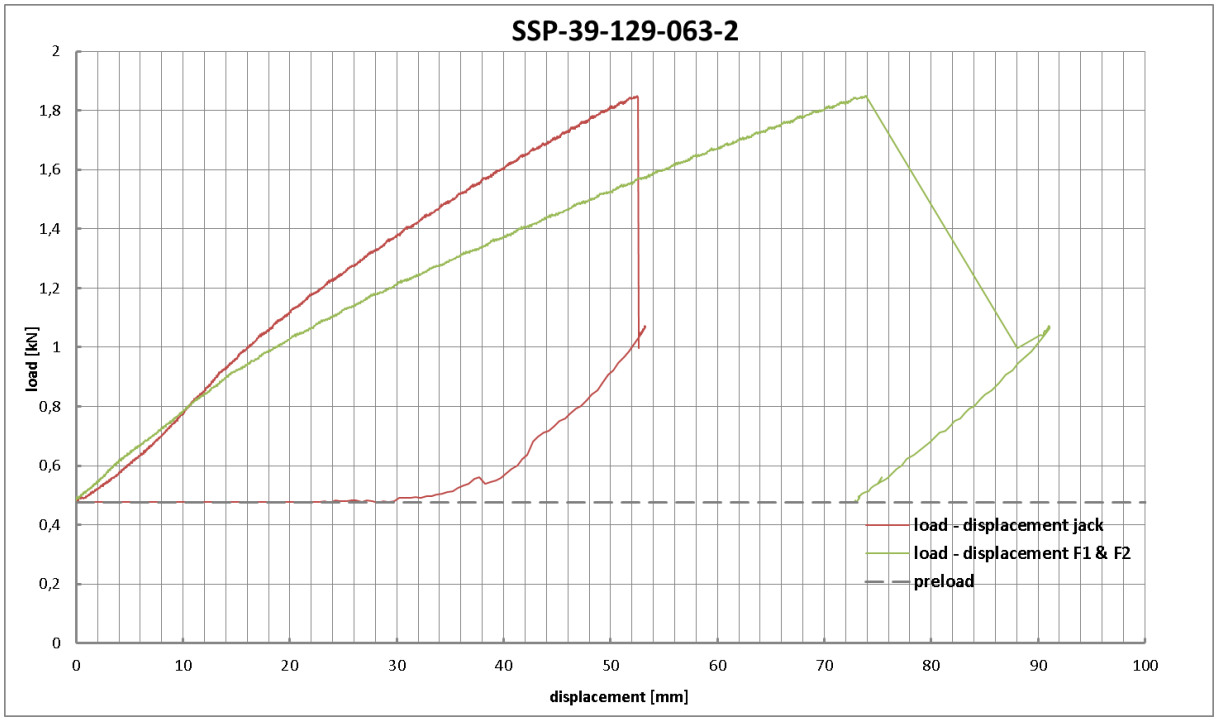
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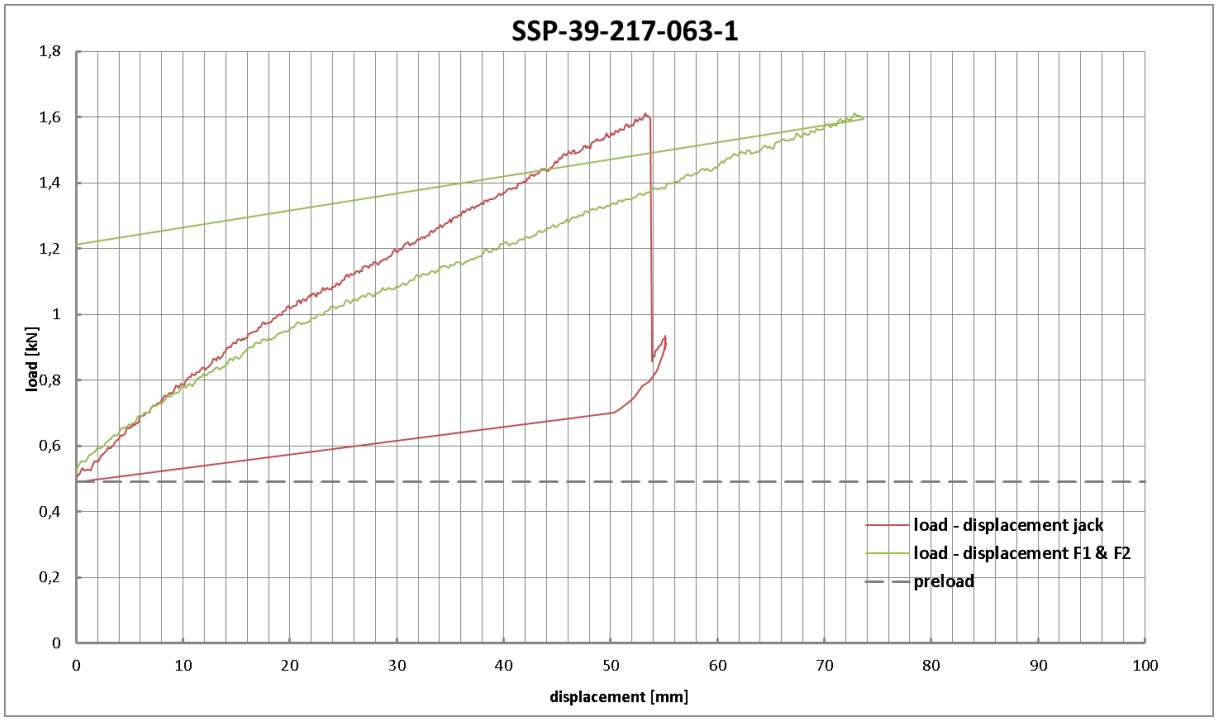
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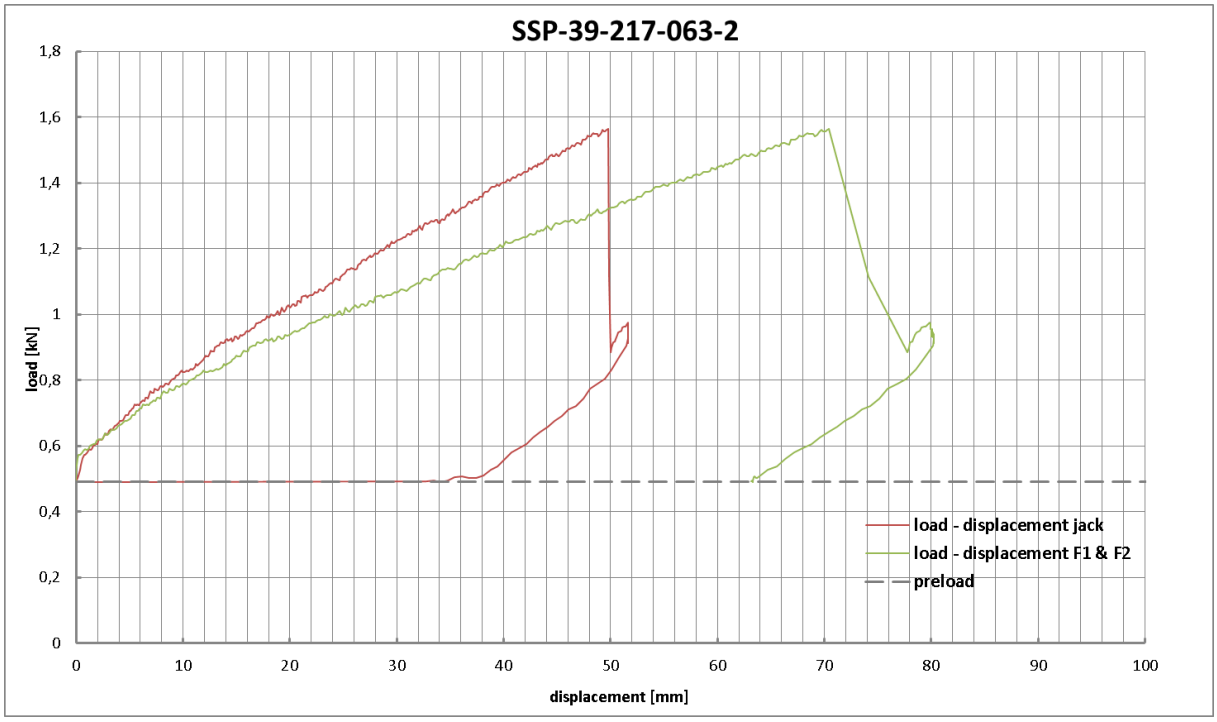
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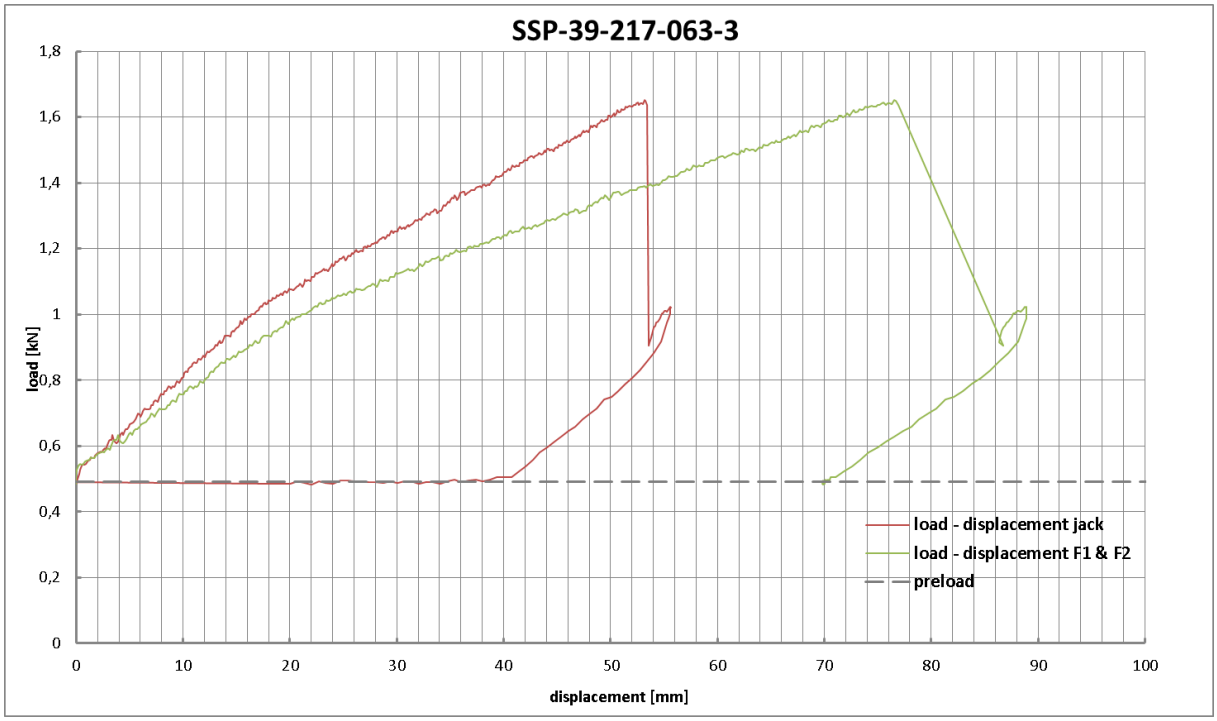
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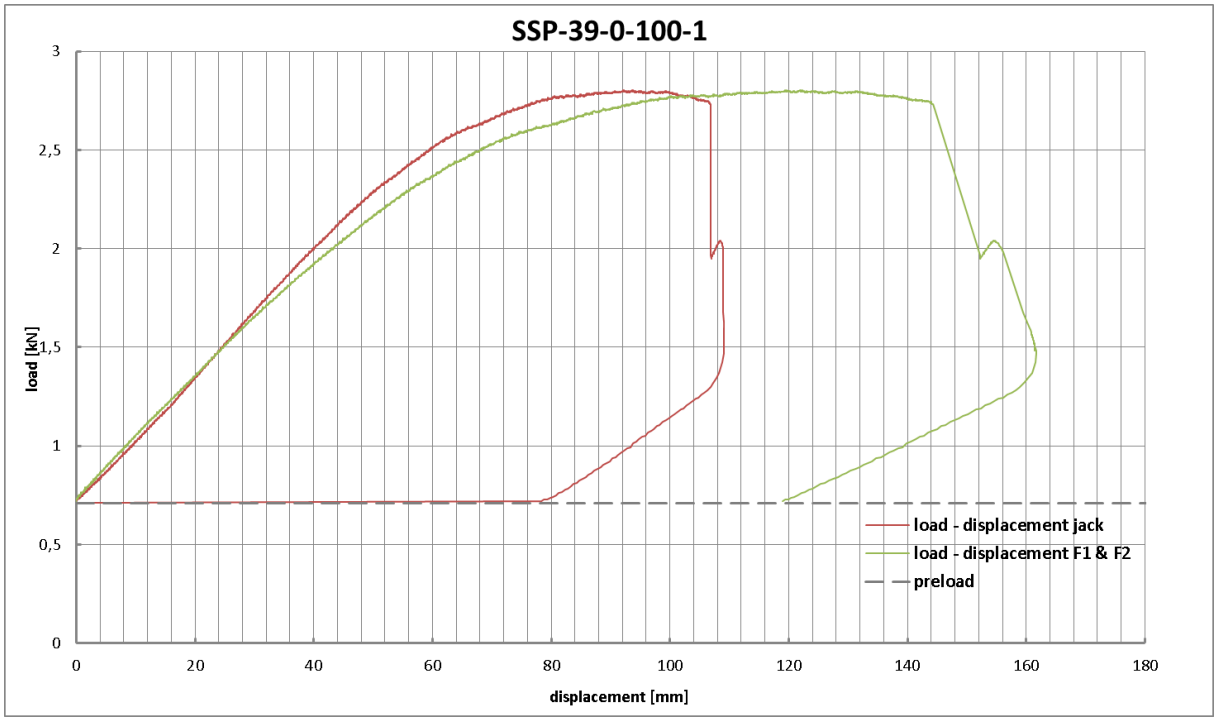
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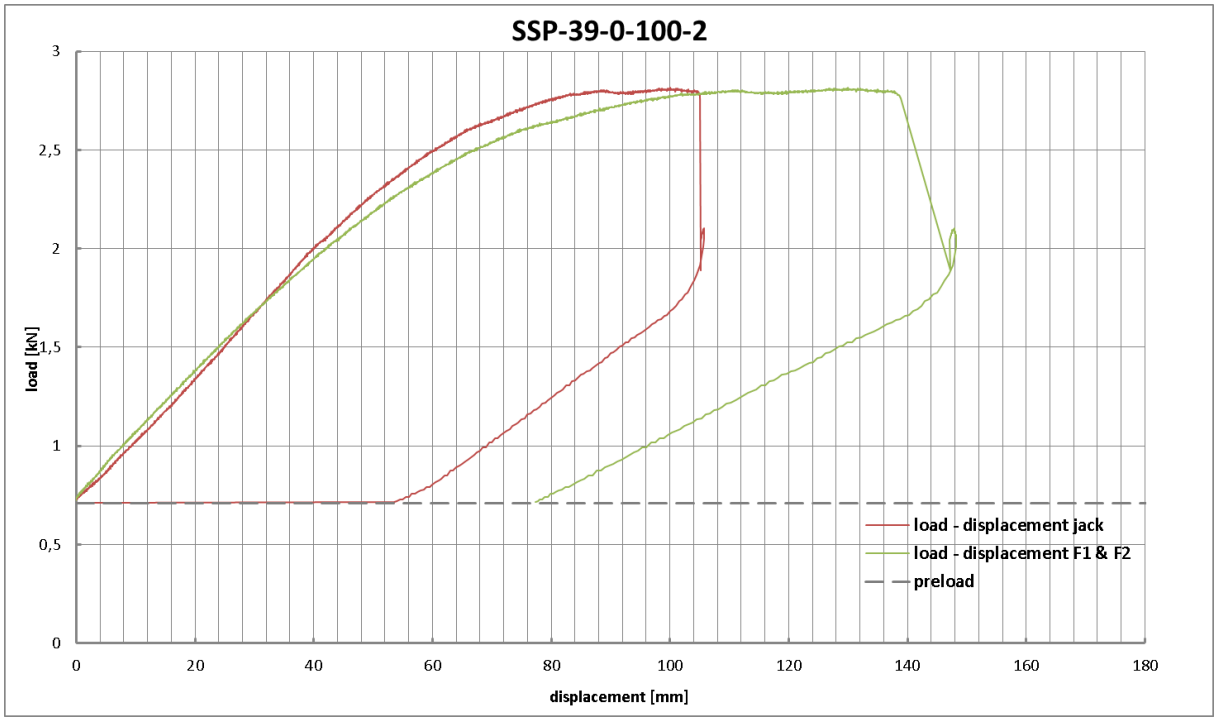
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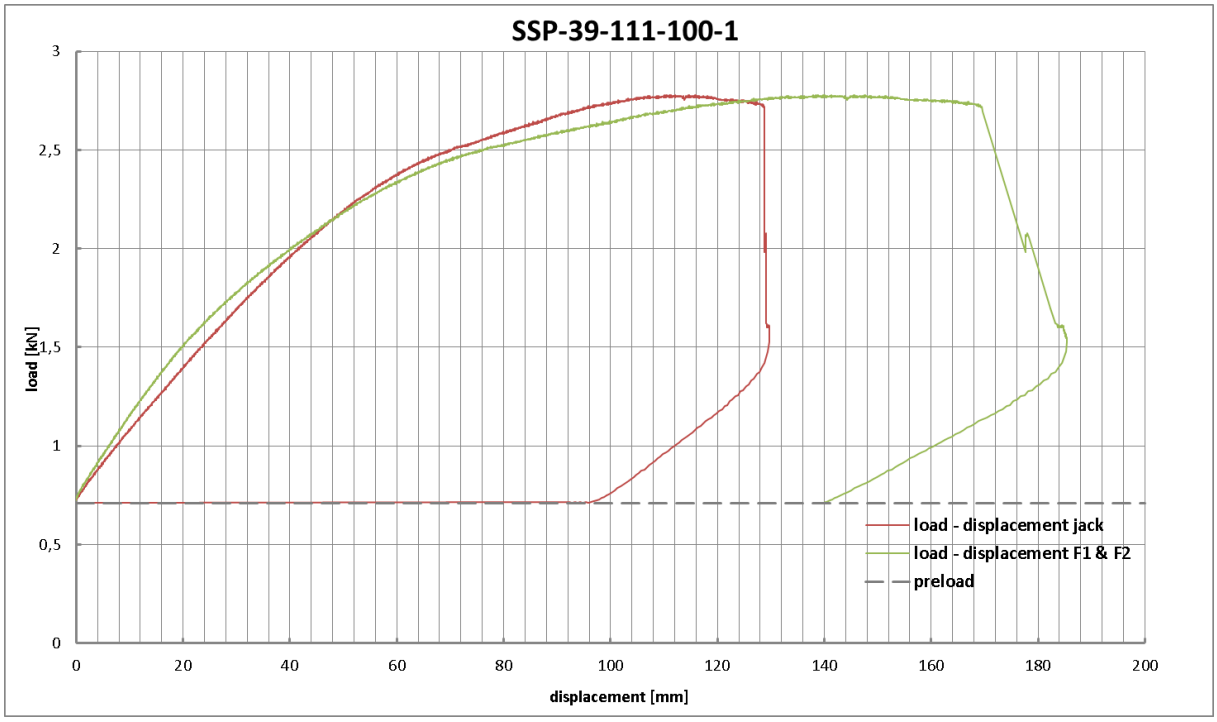
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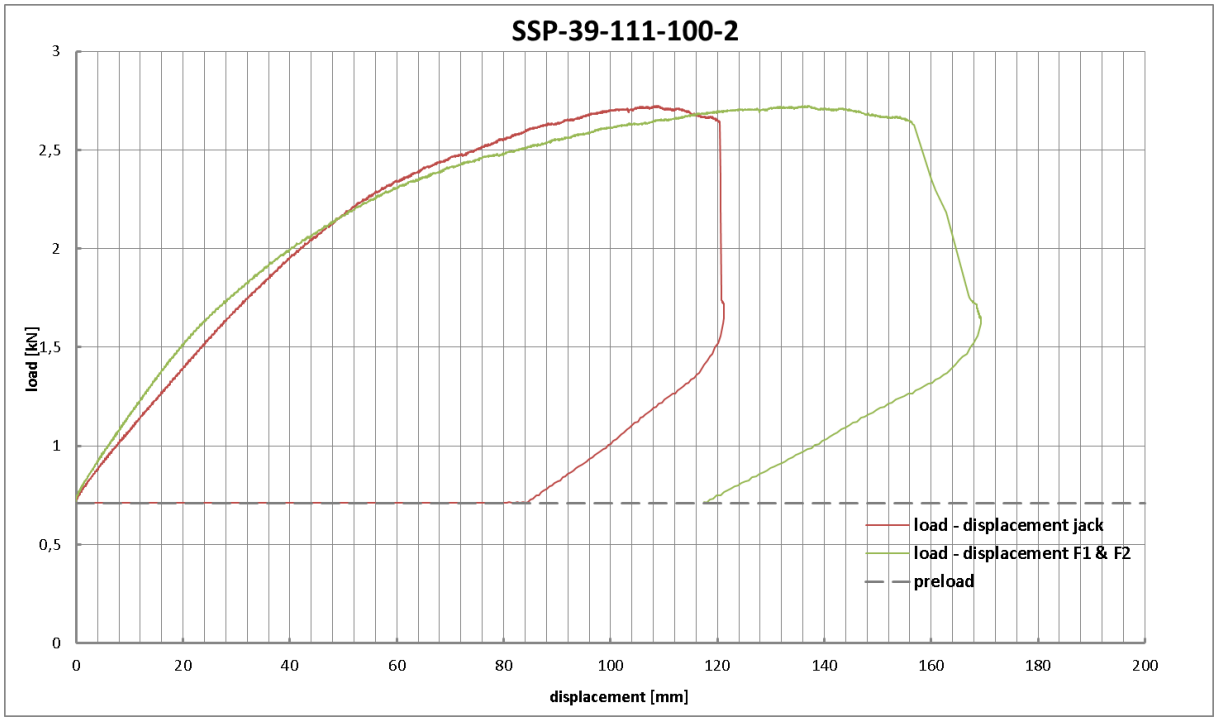
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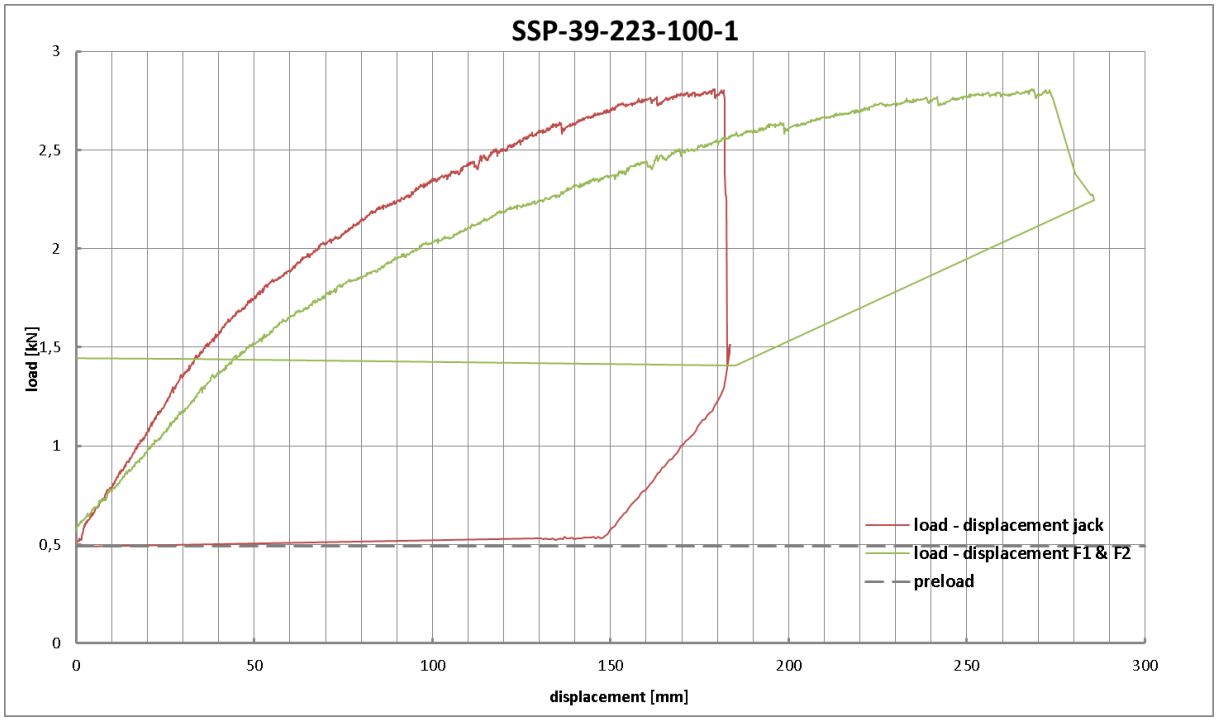
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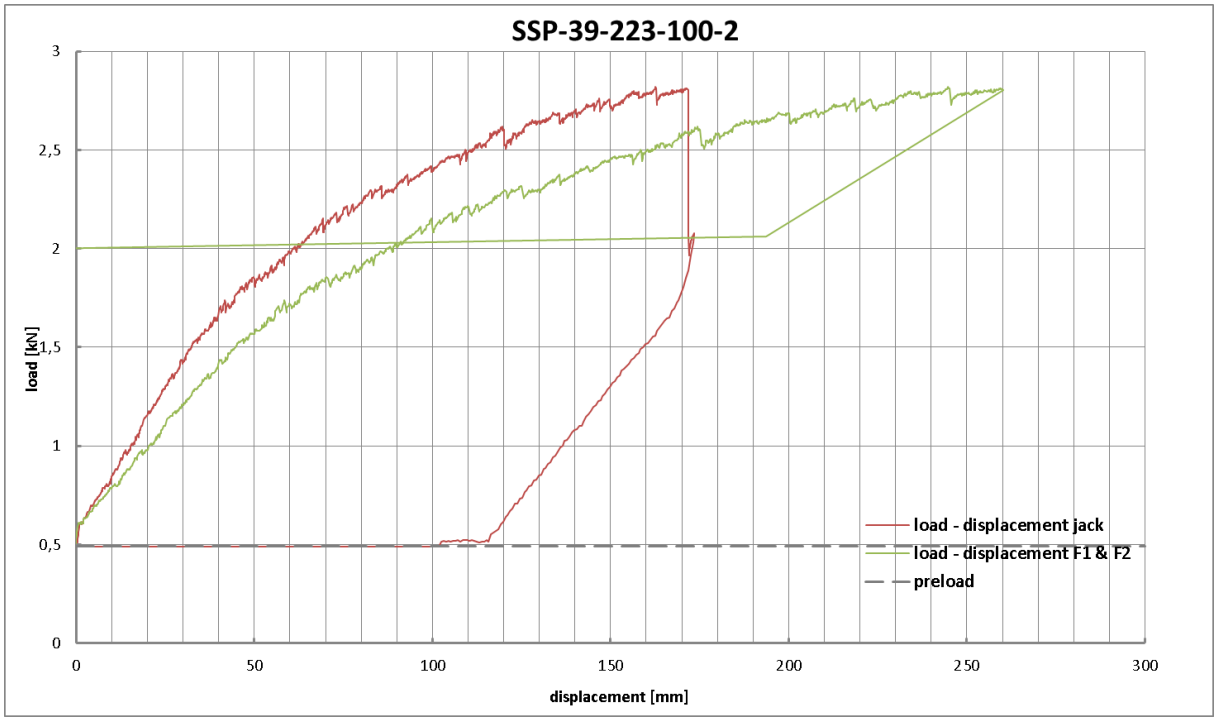
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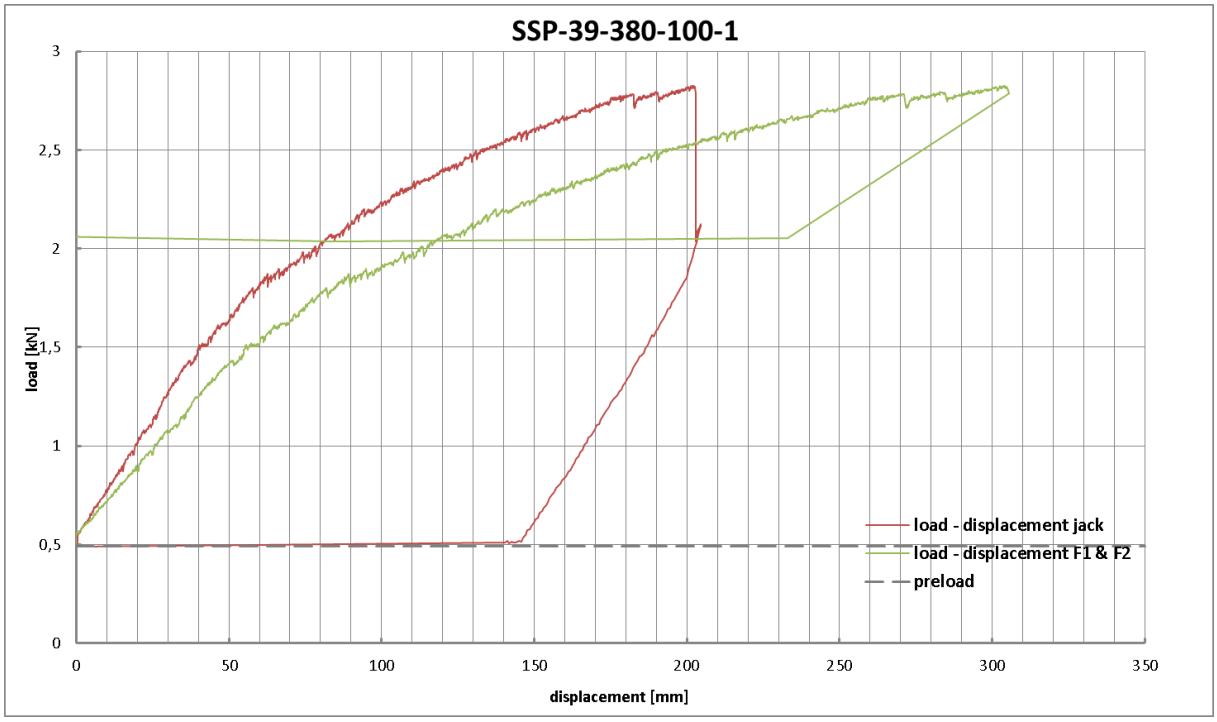
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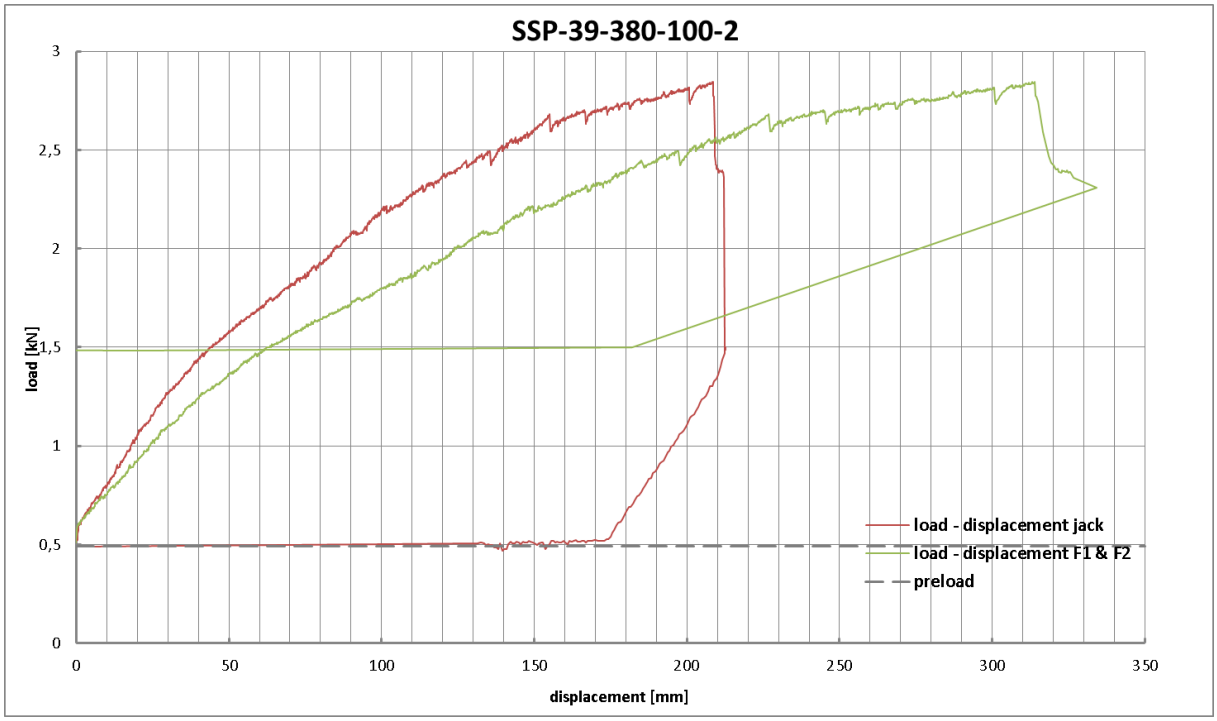

SSP-39-380-100-2
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload

3 Annex C: Single span positive bending tests with horizontal support

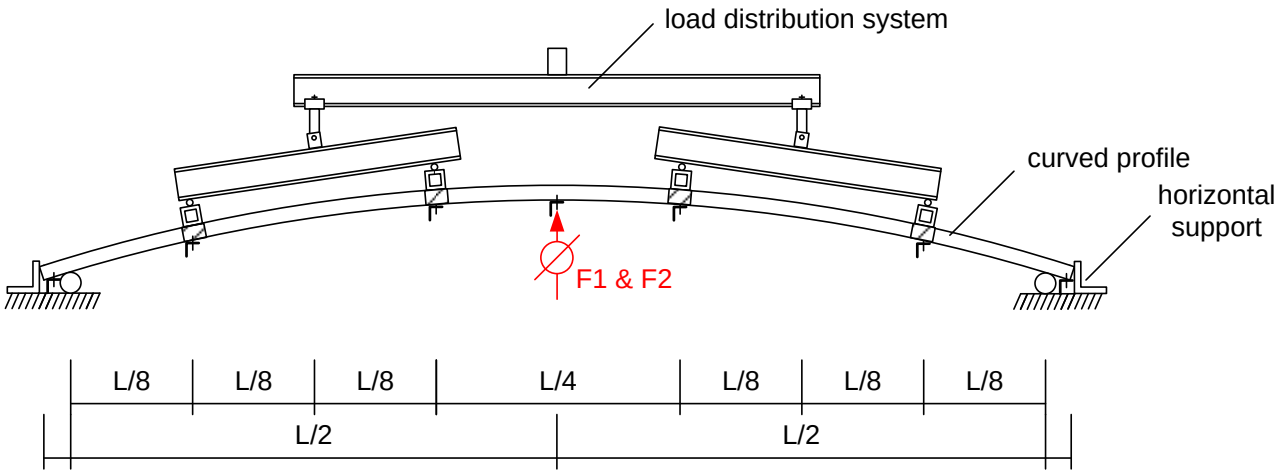


Figure C.1: Schematic test setup

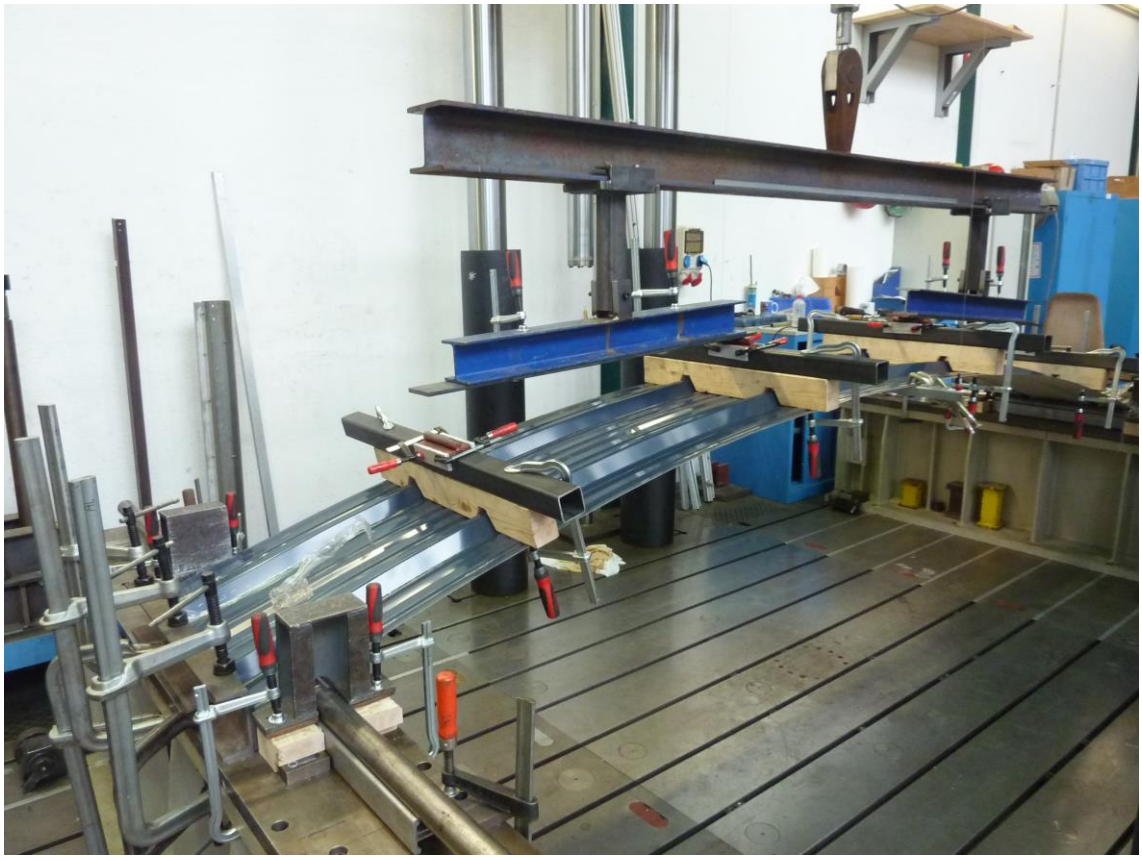


Figure C.2: Test setup, side view

Figure C.3: Plastic deformation at the support

Figure C.4: Failure mode (buckling of the arch) for arch stitch h = 217 mm and h = 380 mm

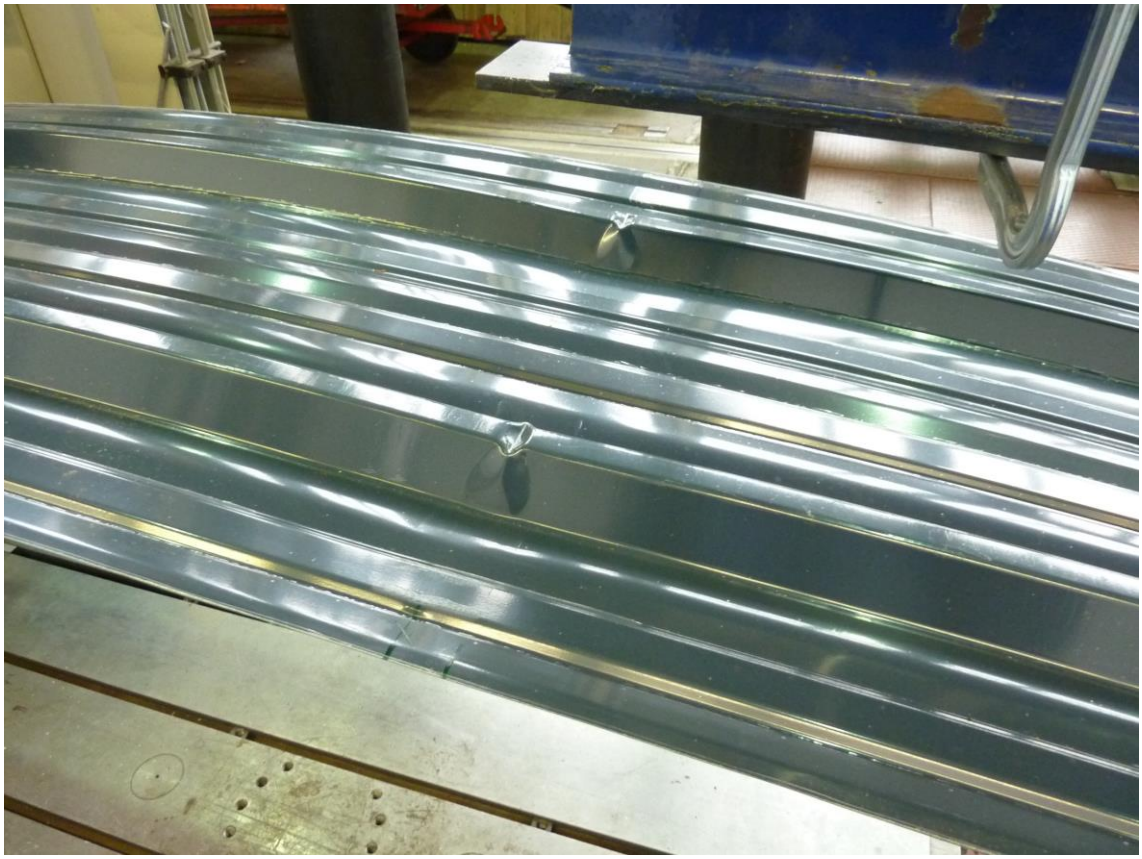


Figure C.5: Failure mode (local buckling) for arch stitch h = 217 mm and h = 380 mm

Figure C.6: Failure mode (SSP-H-576-063-1), side view

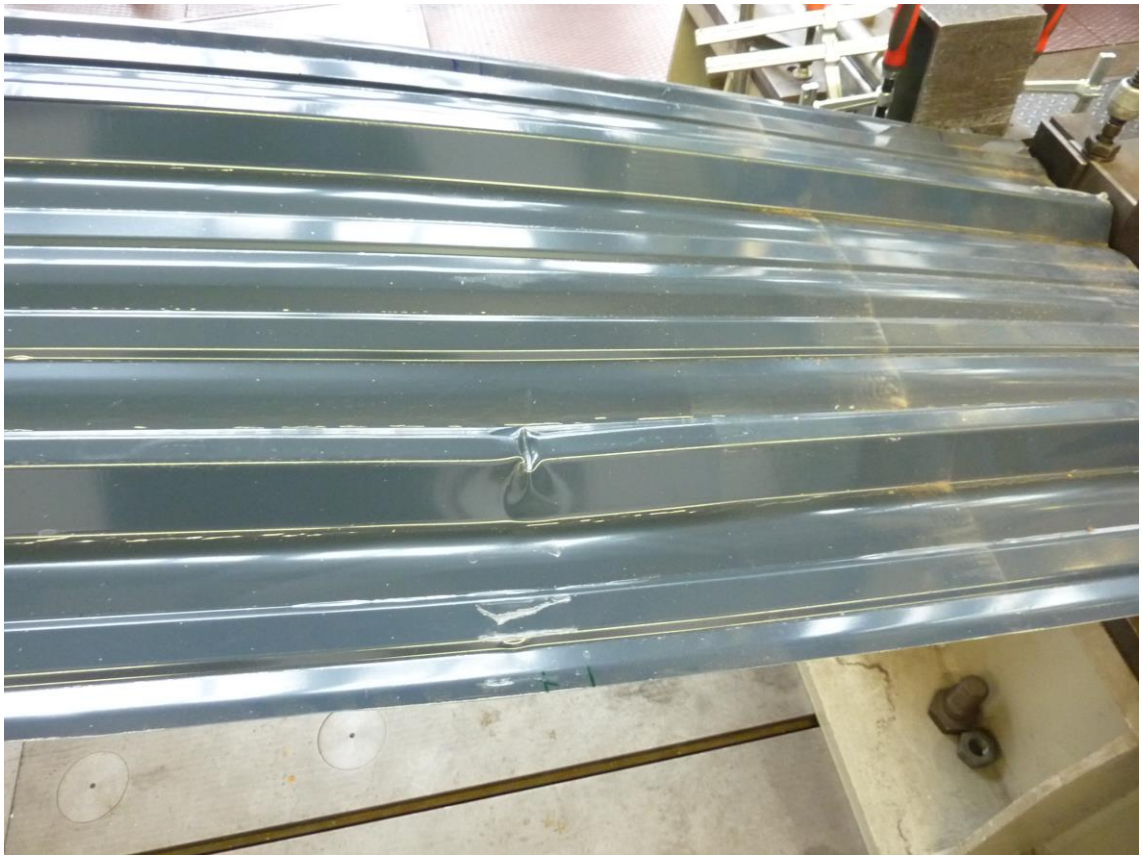


Figure C.7: Failure mode (local buckling) of SSP-H-576-063-1, detailed view

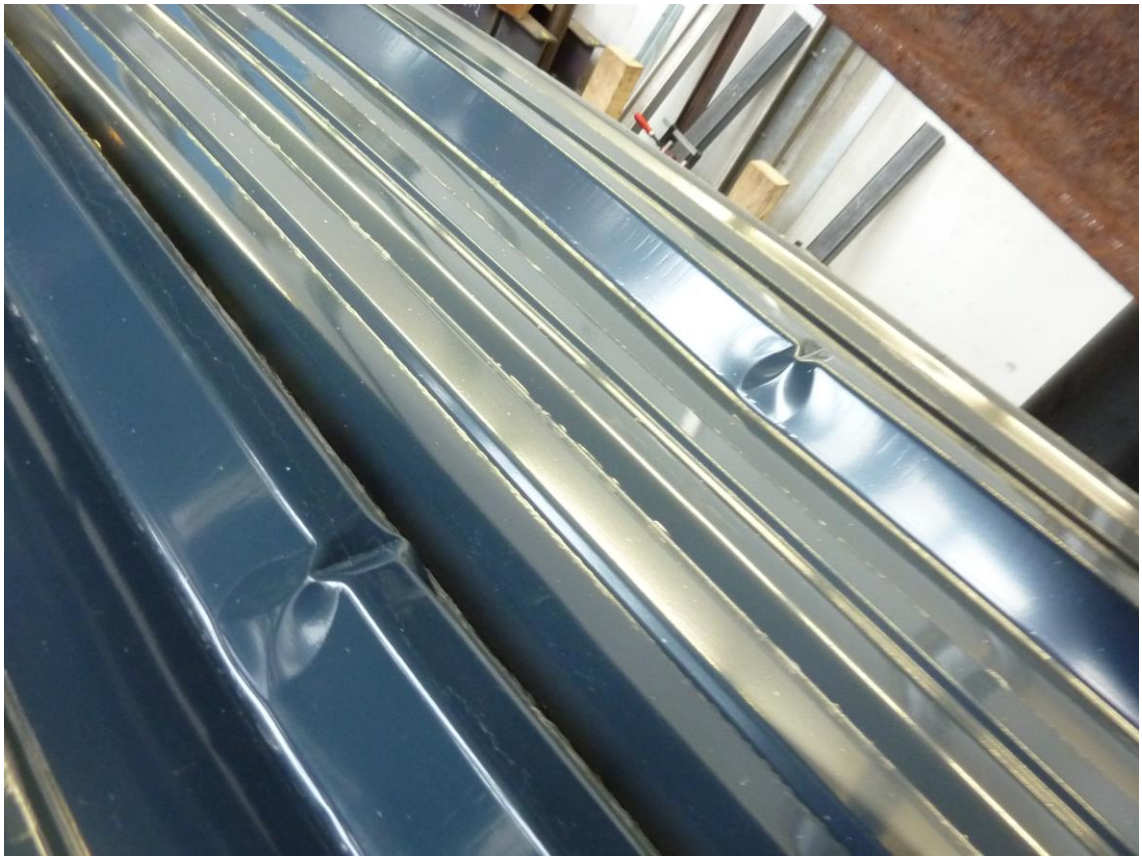
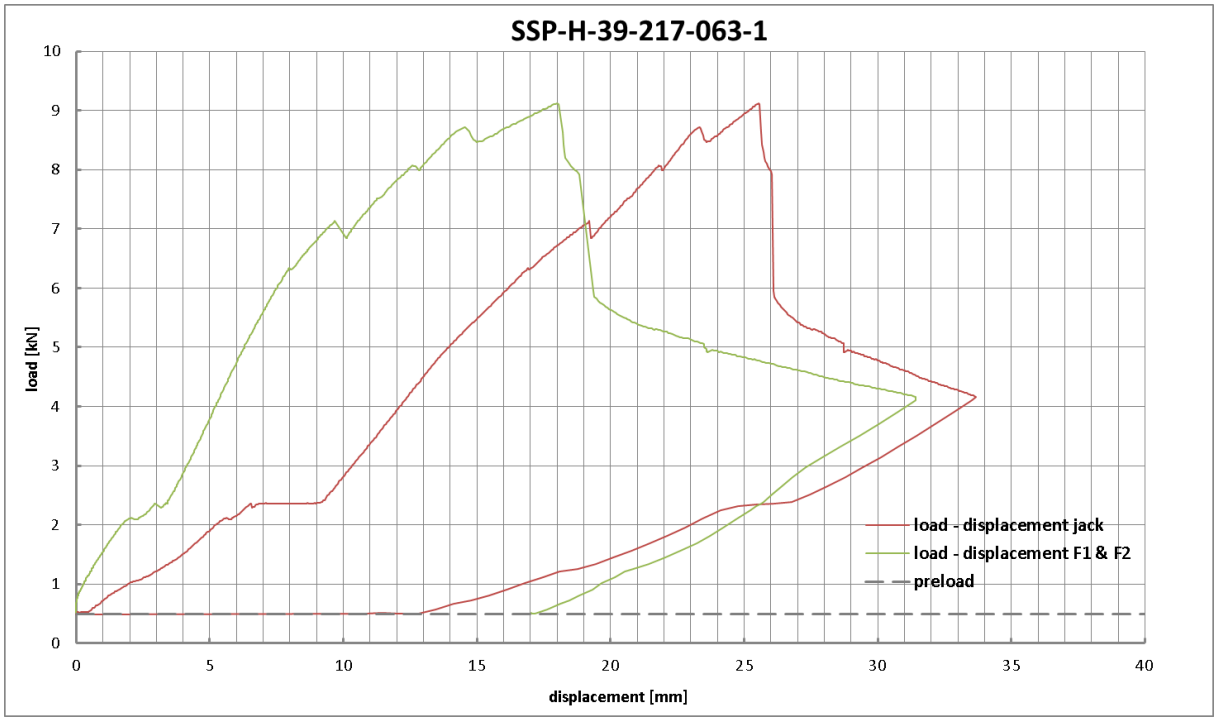
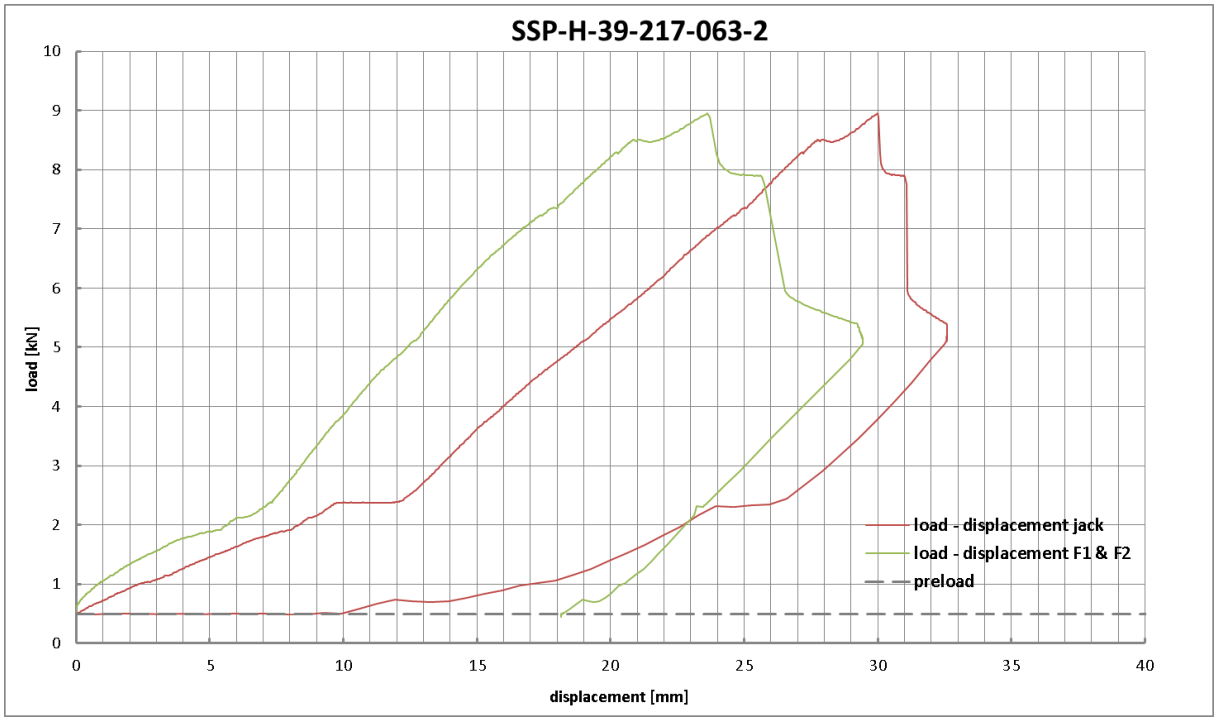
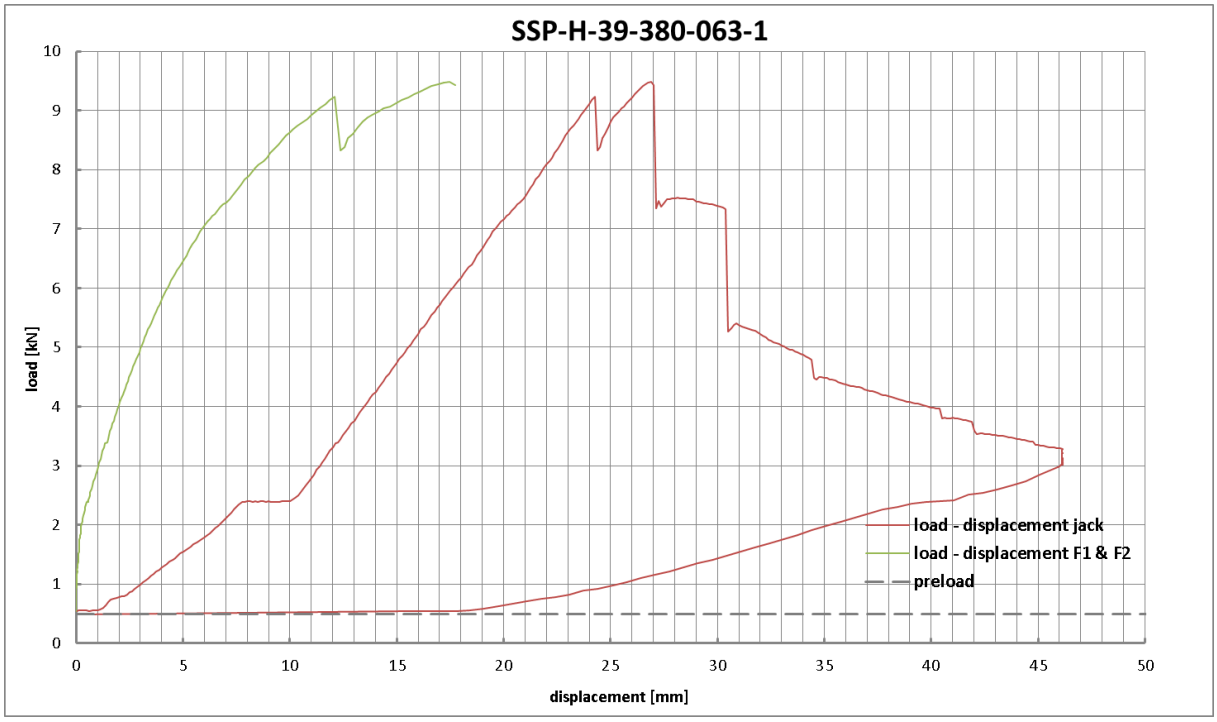


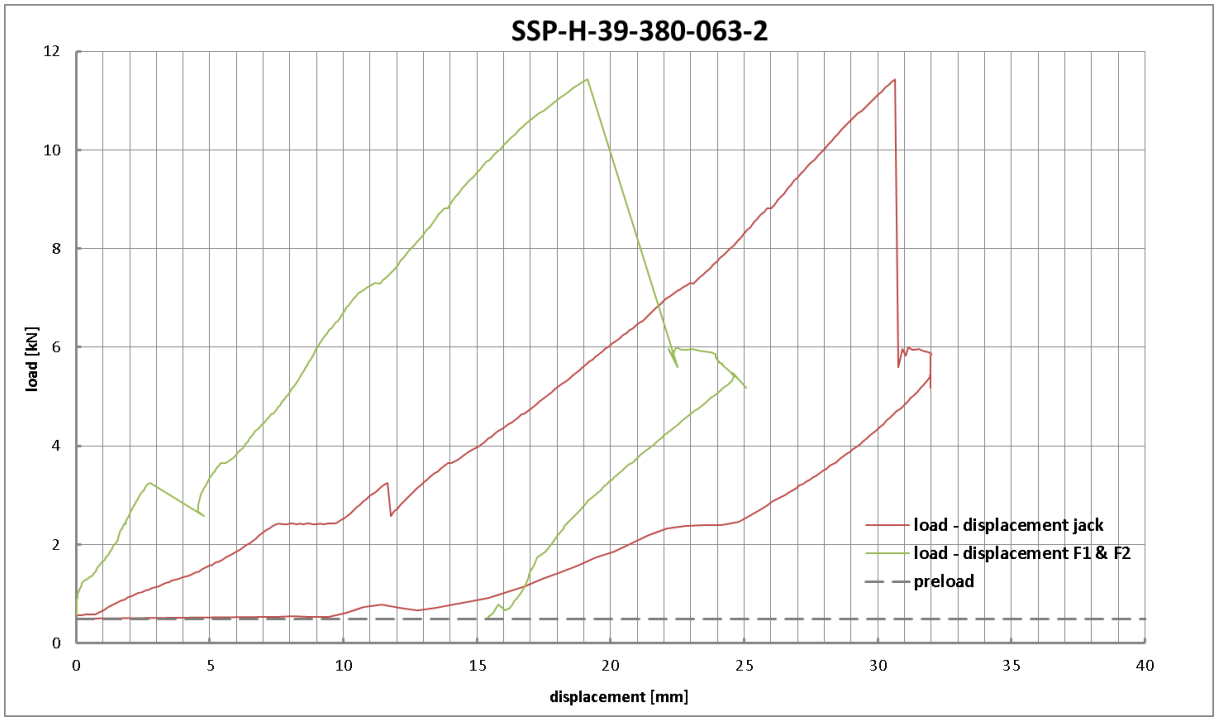
Figure C.8: Failure mode (local buckling) of SSP-H-576-063-2 and SSP-H-576-063-3

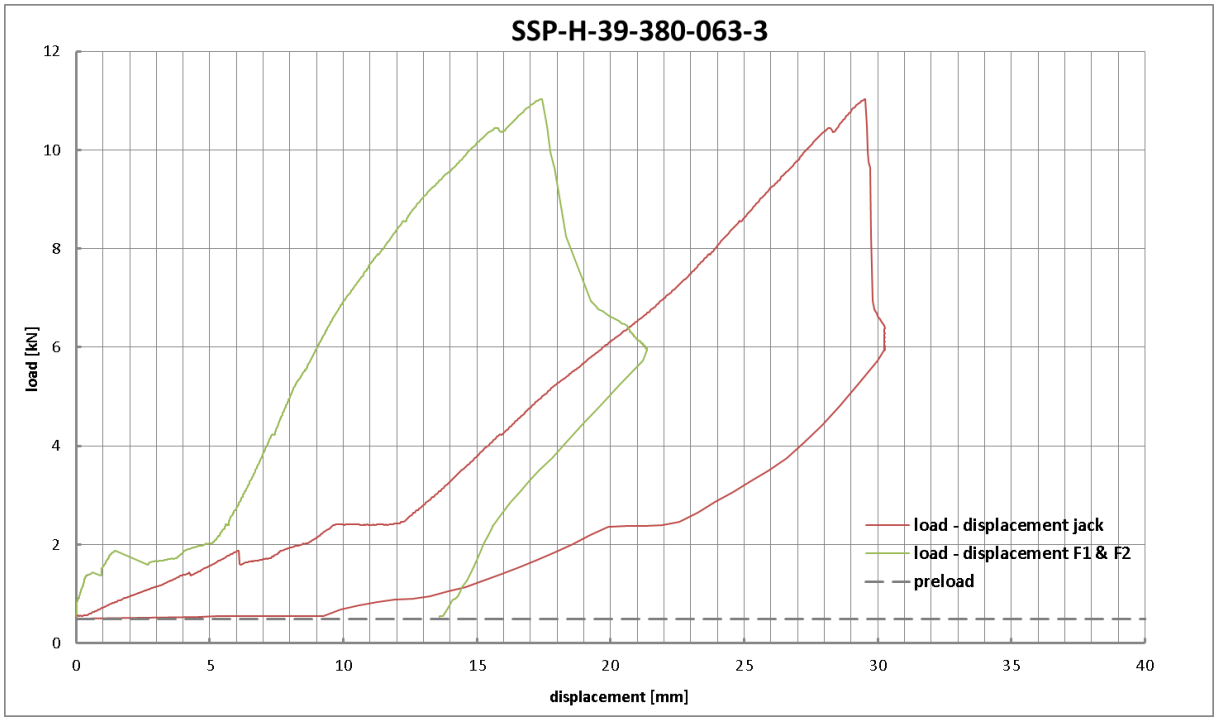
Load-deflection curves:

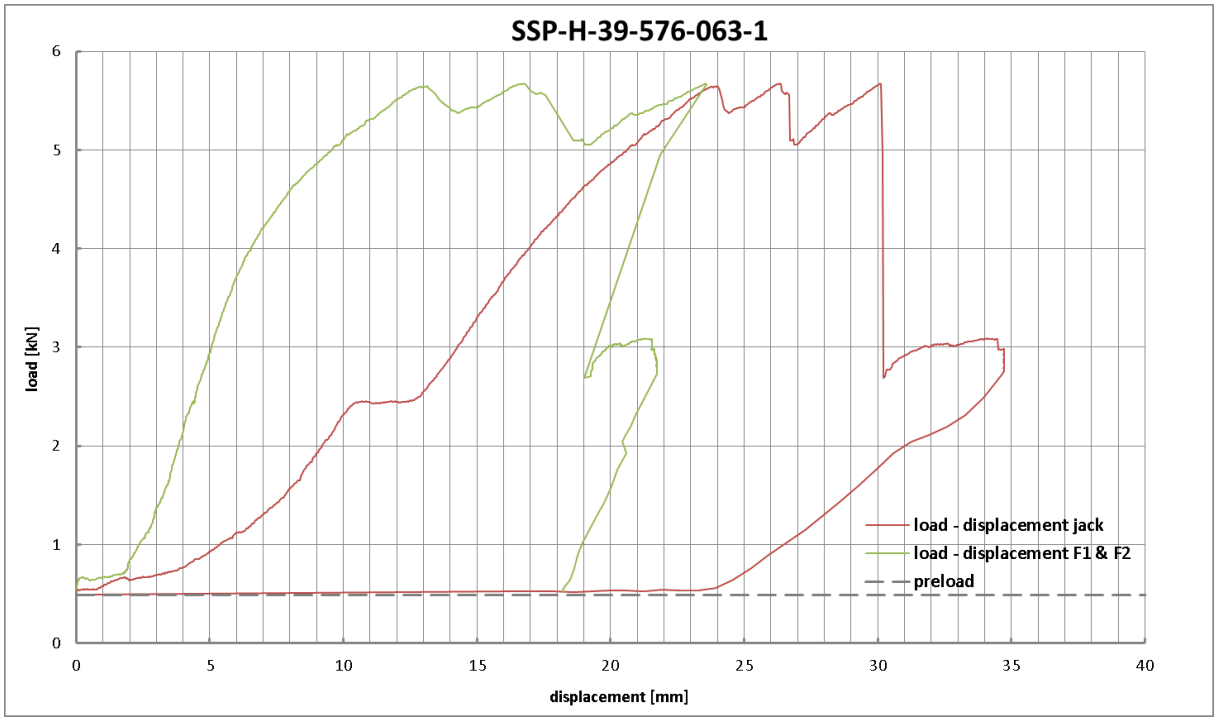


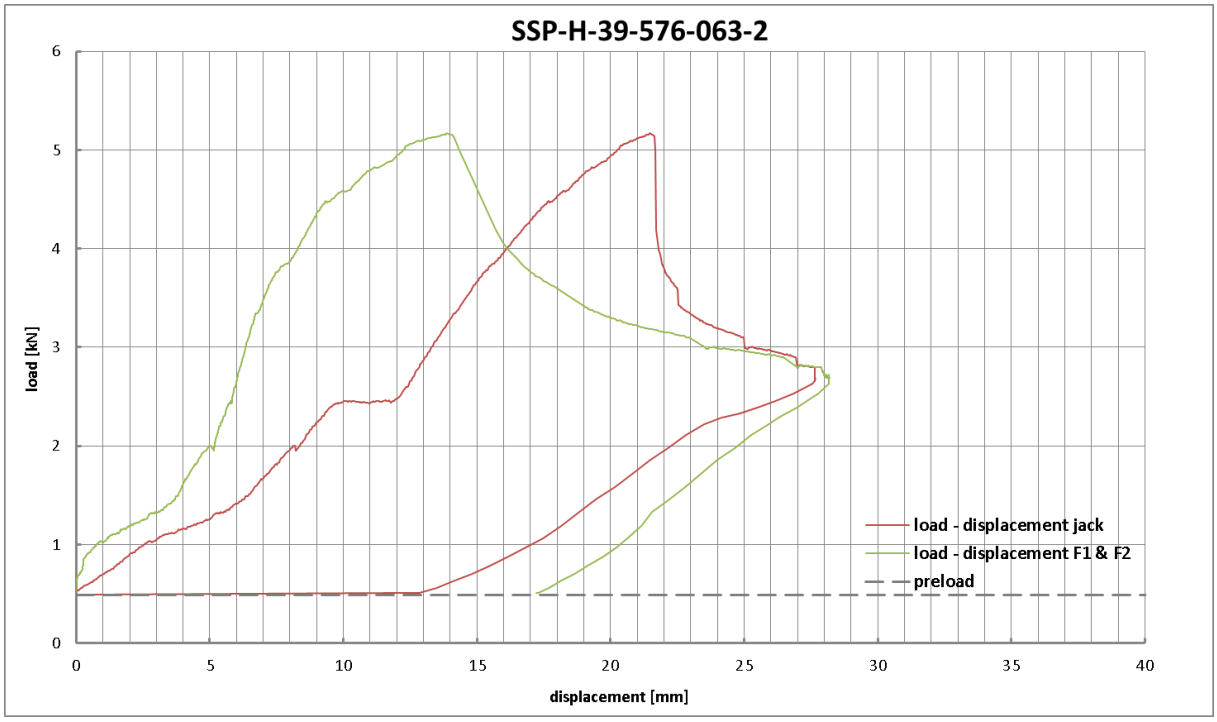


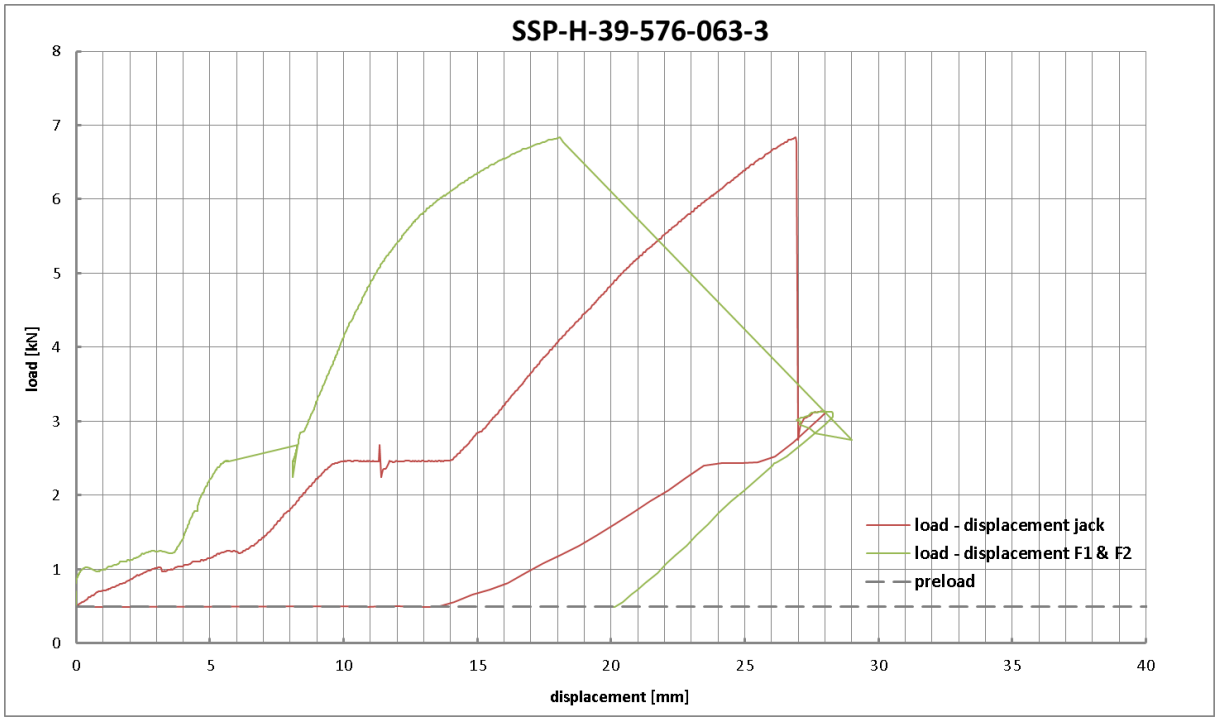

SSP-H-39-380-063-1
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload


SSP-H-39-380-063-2
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload


SSP-H-39-380-063-3
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload

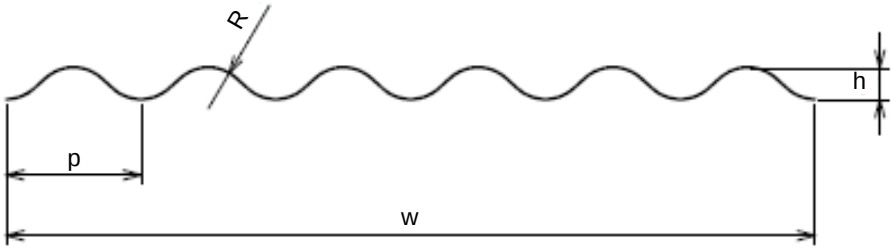

SSP-H-39-576-063-1
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload


SSP-H-39-576-063-2
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload


SSP-H-39-576-063-3
load [kN]
displacement [mm]
load - displacement jack
load - displacement F1 & F2
preload

4 Annex D: Measurement of the profile geometry

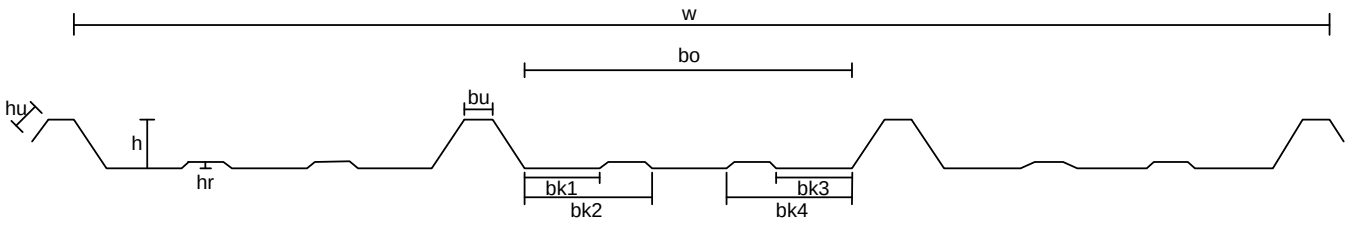
Bacacier 18/76:



	Bacacier 18/76								
	Side lap le	Center	Side lap ri	Side lap le	Center	Side lap ri	Side lap le	Center	Side lap ri
Thickness t_N	0,955	0,975	0,987	0,988	0,971	0,984	0,994	0,978	0,992
Depth of profile h	17,25	17,02	17,52	17,24	17,48	18,5	17,5	17,72	18,3
Pitch of the profile p	77	75,5	76	77,5	75,5	75,5	78	75,5	75,5
Radius of bends r_o	23	23	24	22	23	24	23	22	23
Radius of bends r_u	22	24	23	23	23	24	23	23	23
Lenght of the profile l	3206			3207			3207		
Cover width w	884		884	884		885	884		884
Cover width difference w3	884			-			882		
	-			883			-		

	Bacacier 18/76								
	Side lap le	Center	Side lap ri	Side lap le	Center	Side lap ri	Side lap le	Center	Side lap ri
Thickness t_N	0,567	0,581	0,572	0,555	0,567	0,552	0,544	0,588	0,556
Depth of profile h	17,07	17,9	17,36	17	18,05	17,66	17,24	17,2	17,03
Pitch of the profile p	75,5	76	75	76	75	76	75	75	78
Radius of bends r_o	23	24	23	24	23	22	24	23	23
Radius of bends r_u	24	23	24	23	23	22	23	24	22
Lenght of the profile l	2202			2204			2221		
Cover width w	891		894	890		892	894		893
Cover width difference w3	892			-			895		
	-			891			-		

Bacacier 39/333:



	Bacacier 39/333																	
	1st Rib		2nd Rib		3rd Rib		1st Rib		2nd Rib		3rd Rib		1st Rib		2nd Rib		3rd Rib	
Thickness t_N	0,69		0,69		0,69		0,68		0,68		0,68		0,69		0,7		0,69	
Depth of profile h	39		38				38,1		39				39,1		38,1			
Depth of stiffeners h_{r1}/h_{r2}	-	3,5	3,6	3,8	3,7	-	-	3,8	3,7	3,5	3,6	-	-	3,67	3,72	3,77	3,75	-
Widths of crown b_o	-		257,5		-		-		258,5		-		-		257		-	
Position of flange stiff. b_{k1}/b_{k3}	-	-	58	58	-	-	-	-	56	59,5	-	-	-	-	59	58,5	-	-
Position of flange stiff. b_{k2}/b_{k4}	-	-	100	99,5	-	-	-	-	101	100,5	-	-	-	-	100,5	99,5	-	-
Crown curvature h_e	-		21,5		-		-		20,8		-		-		21,2		-	
Widths of valley b_u	21		21,5				22		21,5				22,4		22,6			
Lenght of the profile l	3199						3200						3201					
Cover width w	667,5		660				666		668				665		668			
Cover width difference w_3	667						667						668					
Radius of bends r_{o1}, r_{o2}	4,5		4,5				4,5		4,5				4,5		4			
Radius of bends r_{u1}, r_{u2}	6		6				5,5		6				6		6			

	Bacacier 39/333																	
	1st Rib		2nd Rib		3rd Rib		1st Rib		2nd Rib		3rd Rib		1st Rib		2nd Rib		3rd Rib	
Thickness t_N	1,041		1,016		1,014		1,068		1,058		1,043		1,005		1,024		1,024	
Depth of profile h	38,6		38,75				38,8		38,6				38,3		38,8			
Depth of stiffeners h_{r1}/h_{r2}	-	3,2	3,1	4,6	3,5	-	-	3,2	3,5	3,2	3,3	-	-	3,2	3	3	3	-
Widths of crown b_o	-		260,5		-		-		258		-		-		260		-	
Position of flange stiff. b_{k1}/b_{k3}	-	-	60	101	59	100	-	-	59	100	58	100	-	-	59	101	58	99
Position of flange stiff. b_{k2}/b_{k4}	58	98,5	59	100	-	-	58	100	59	100	-	-	59	100	59,5	100,5	-	-
Crown curvature h_e	-		-14,66		-		-		-13,7		-		-		-14		-	
Widths of valley b_u	22		22				22		22				22,5		22			
Lenght of the profile l	4233						4231						4232					
Cover width w	664		670				666		668				665		668			
Cover width difference w_3	674						-						-					
Radius of bends r_{o1}, ru1	6		6				6		6				6		6			