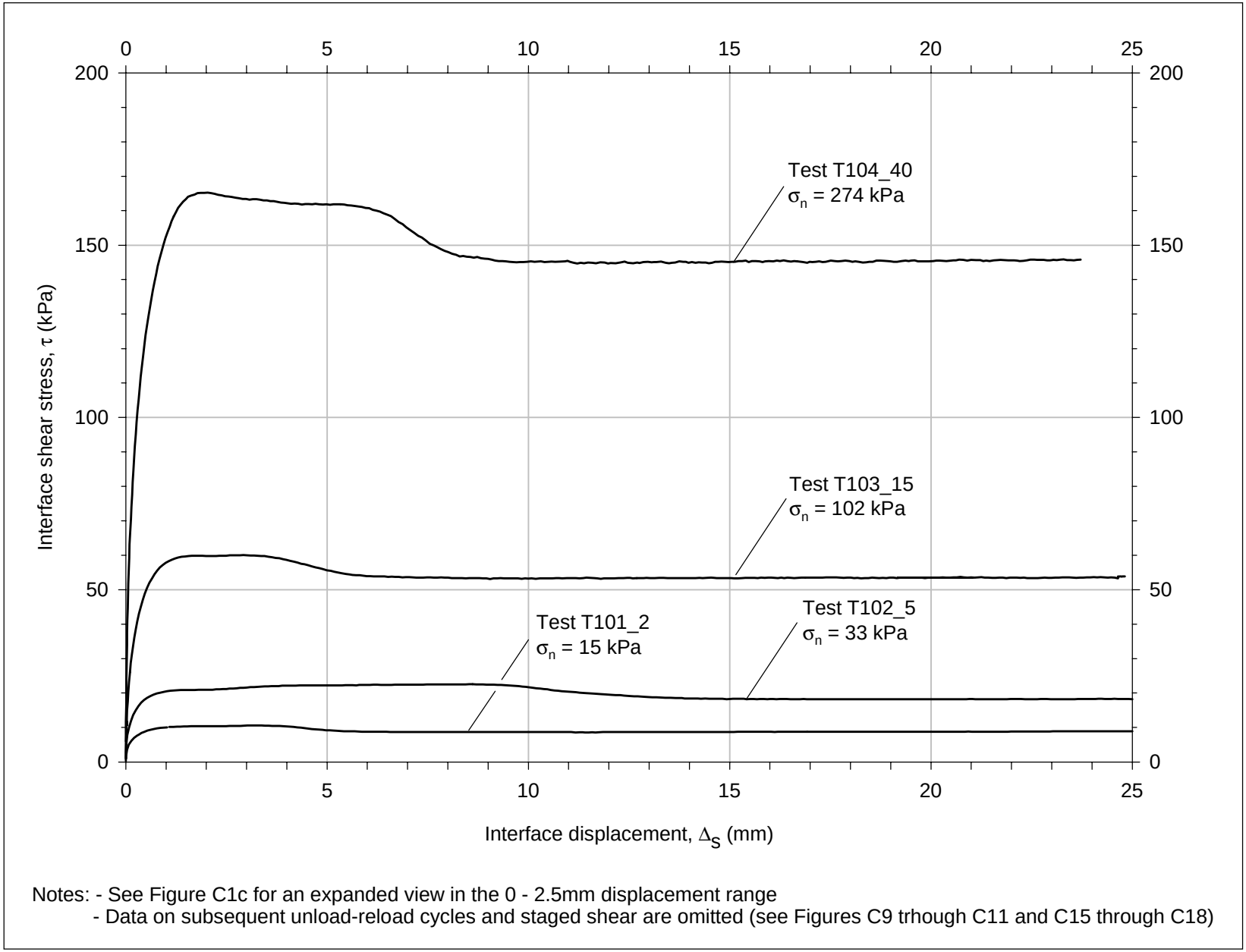
Appendix C
Results of Interface Tests

This appendix contains the results of all the interface tests performed during this investigation. Table C1 shows the organization of the figures. Symbols used in this appendix are listed and defined in the Notation (Appendix F).

Table C1
Organization of the Figures in Appendix C

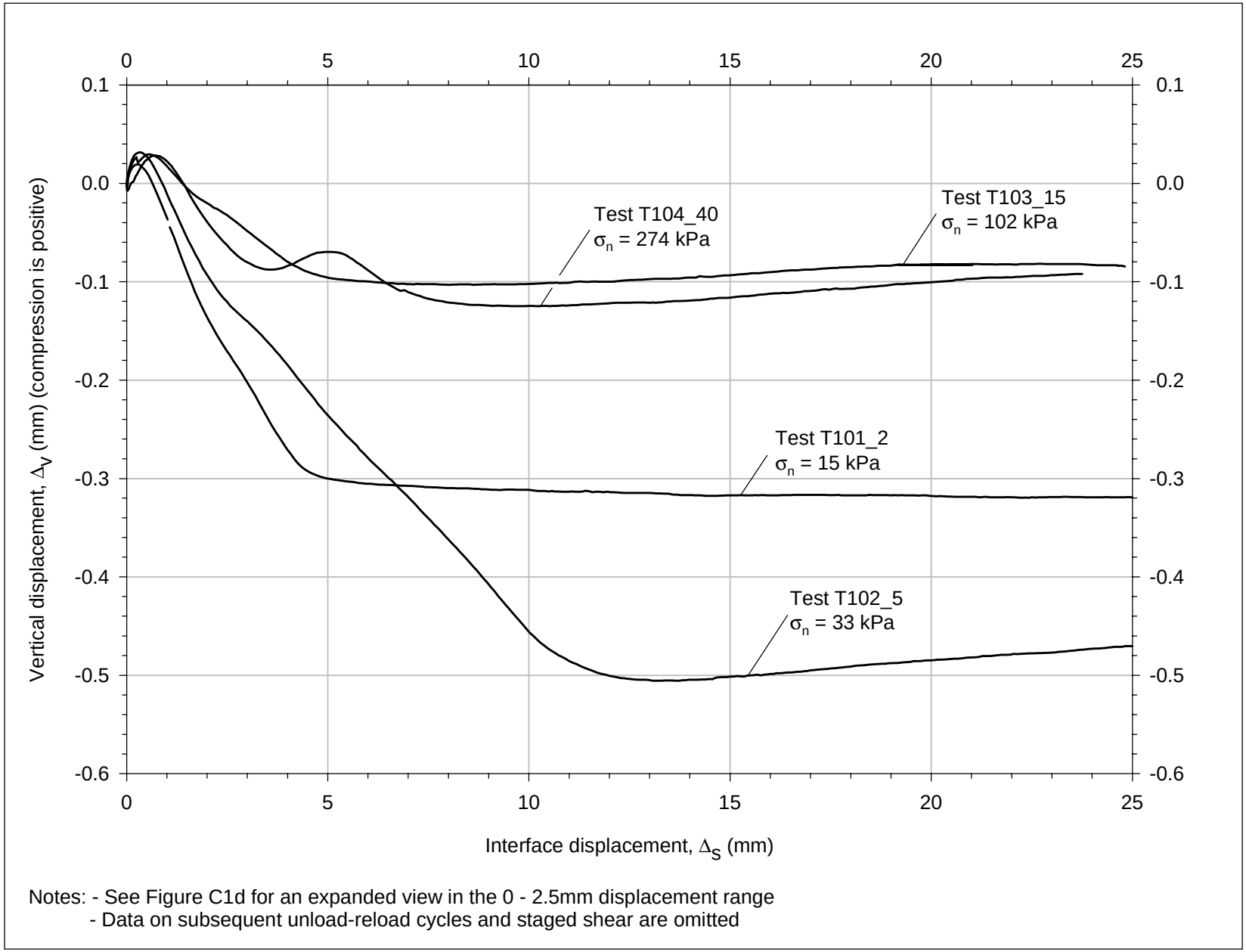
Type of Test	Dense Density Sand Against Concrete	Medium Dense Density Sand against Concrete	Dense Light Castle Sand against Concrete
Initial loading (virgin shear)	C1 and C2	C3 and C4	C5 and C6
Staged shear	C7 through C11	-	-
Unload-reload	C12 through C18	C19 through C21	C22 through C25
Multi-directional stress path	C26 through C28	C29	C30



Notes: - See Figure C1c for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles and staged shear are omitted (see Figures C9 trhough C11 and C15 through C18)

a. Shear stress vs. interface displacement data

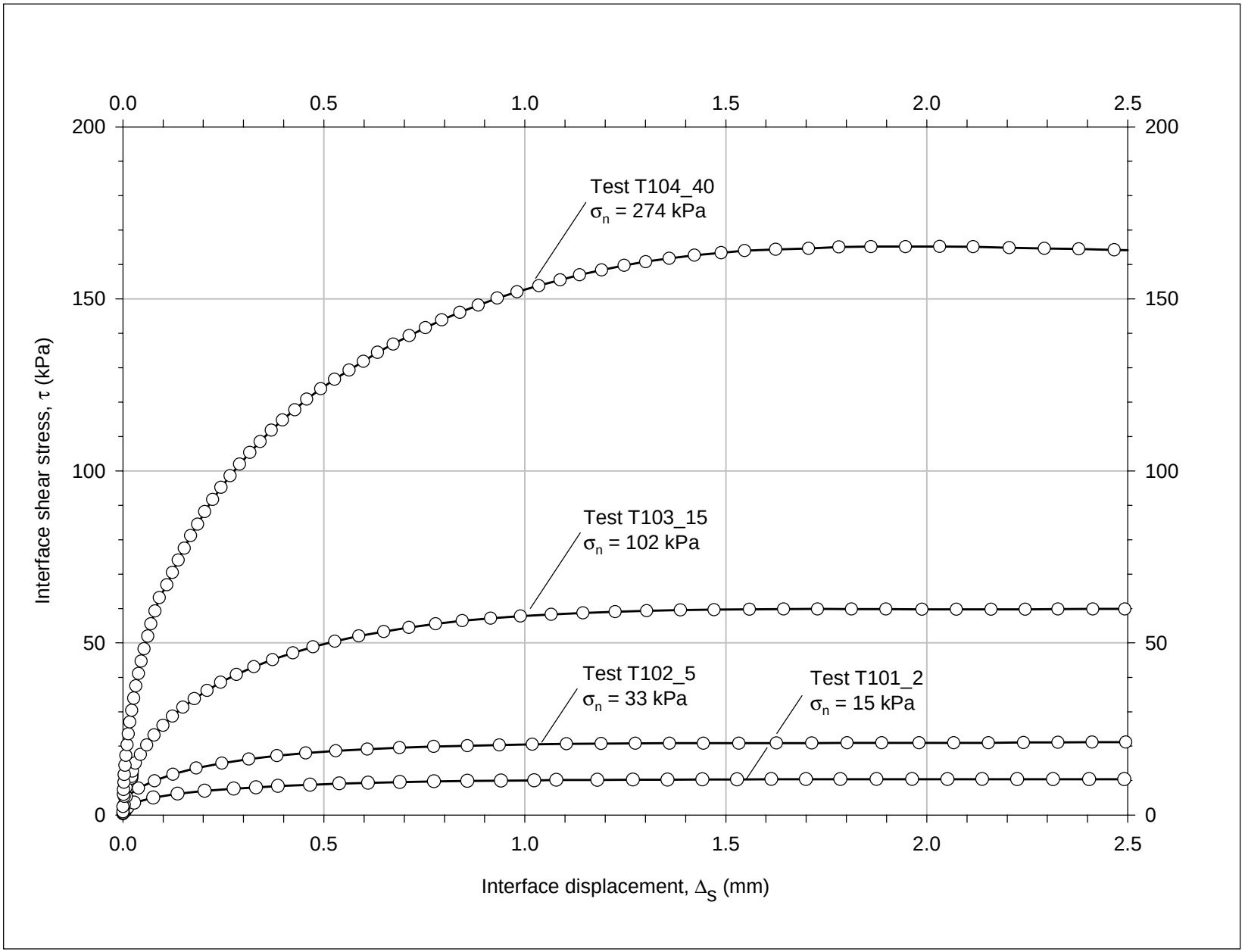
Figure C1. Results of initial loading tests on dense Density Sand-to-concrete interface (Sheet 1 of 4)



Notes: - See Figure C1d for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles and staged shear are omitted

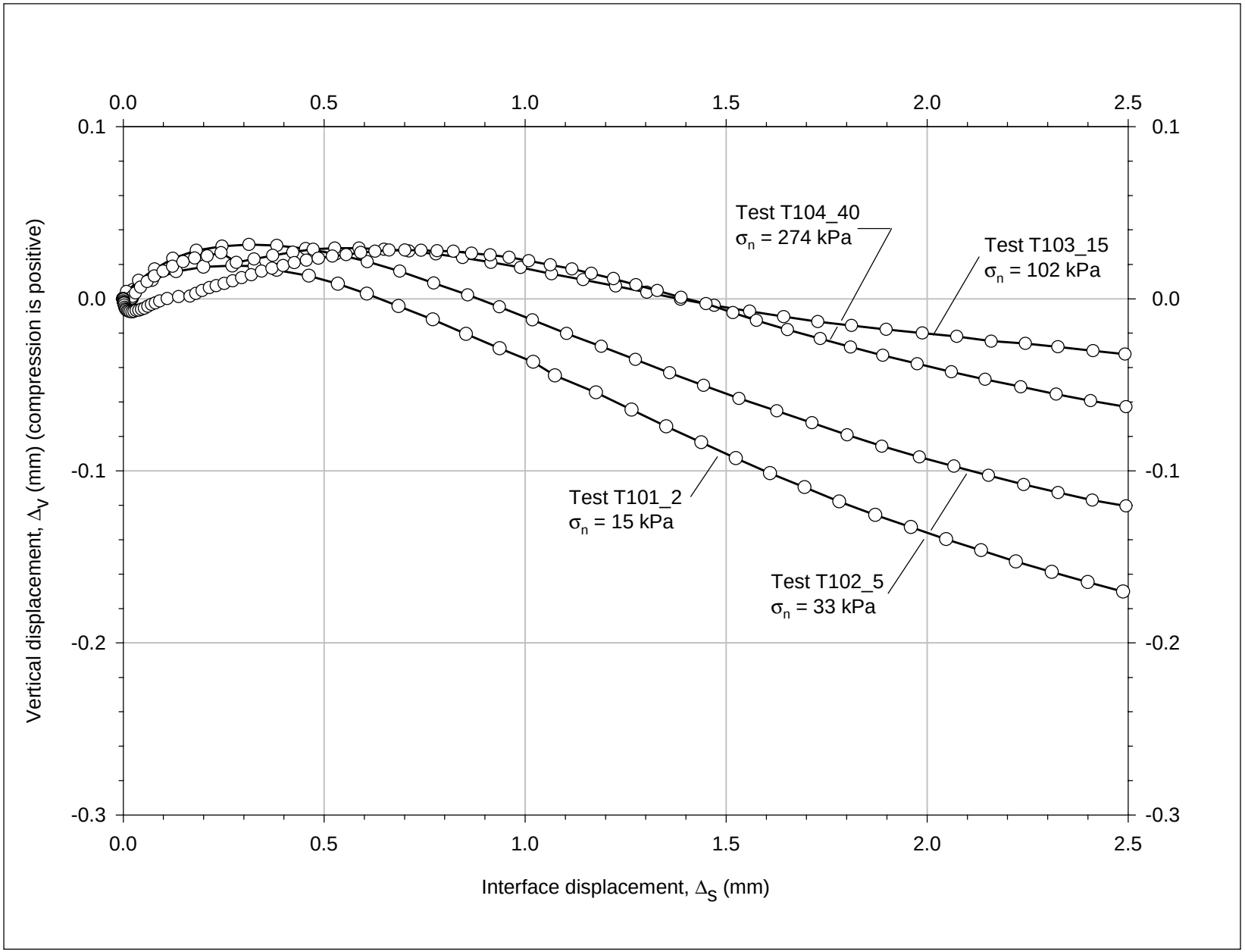
b. Vertical vs. horizontal interface displacement data

Figure C1. (Sheet 2 of 4)



c. Enlargement of Figure C1a

Figure C1. (Sheet 3 of 4)



d. Enlargement of Figure C1b

Figure C1. (Sheet 4 of 4)

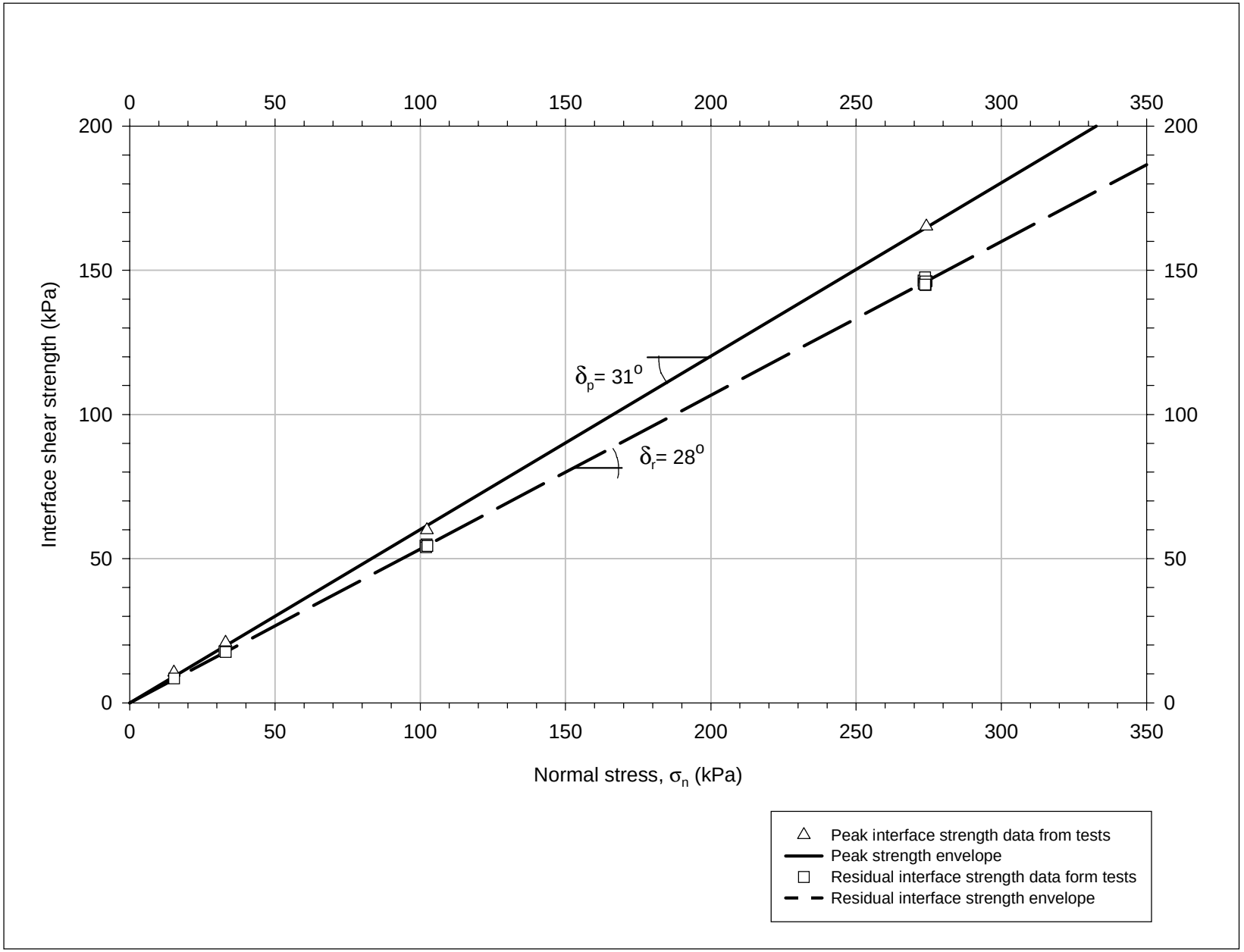
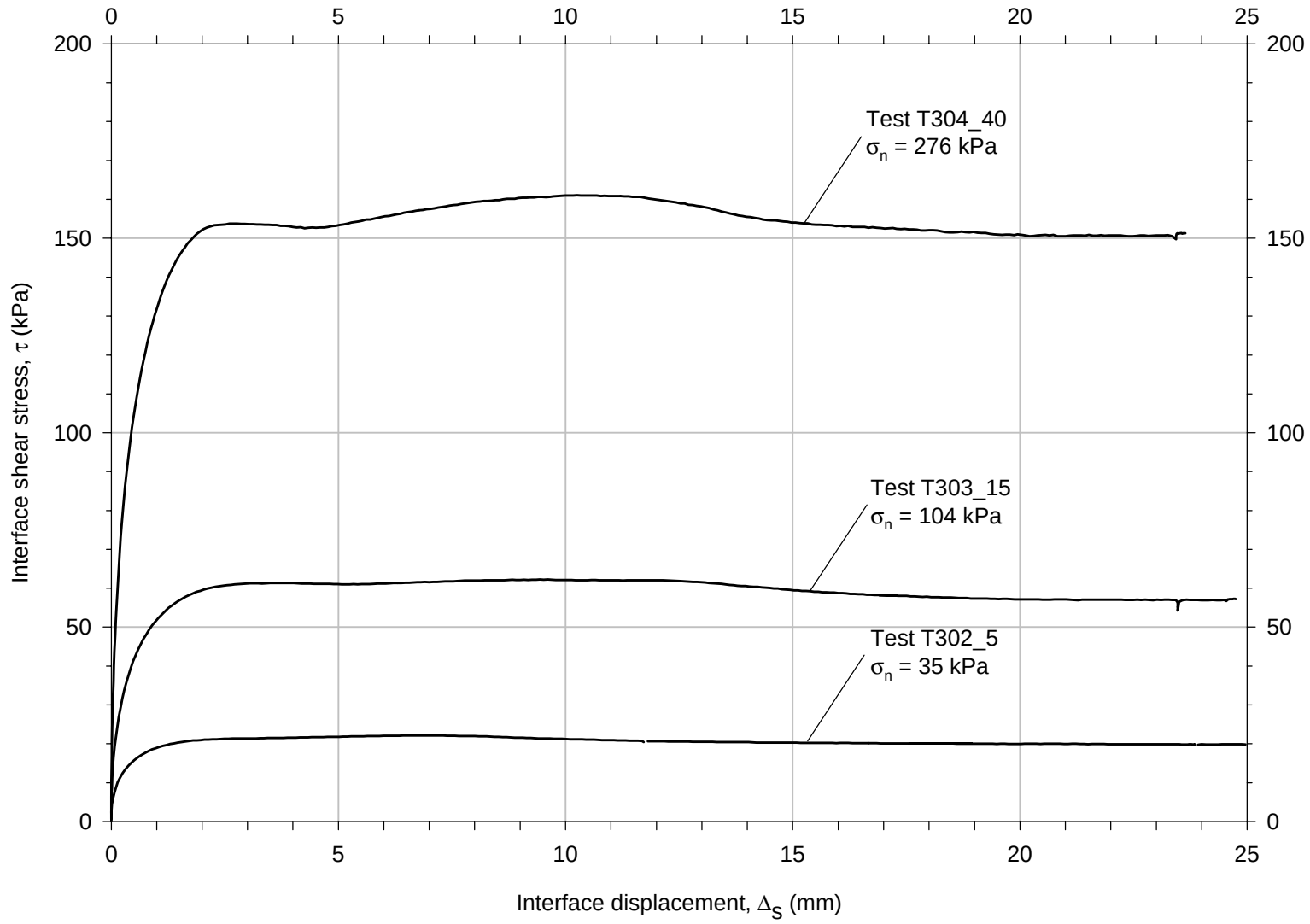


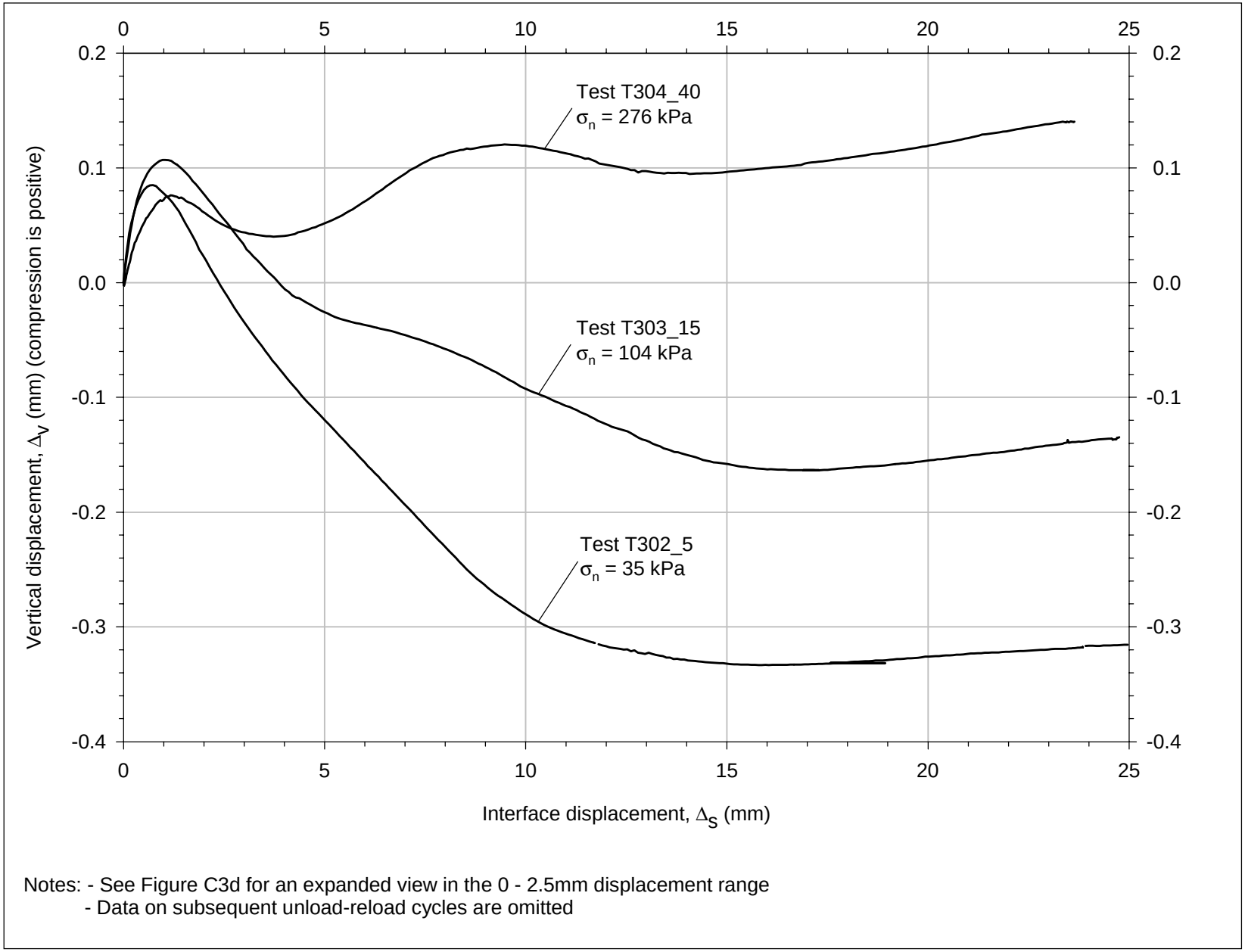
Figure C2. Peak and residual shear strength envelopes for initial loading on dense Density Sand-to-concrete interface.



Notes: - See Figure C3c for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles are omitted (see Figures C19 through C21)

a. Shear stress vs. interface displacement data

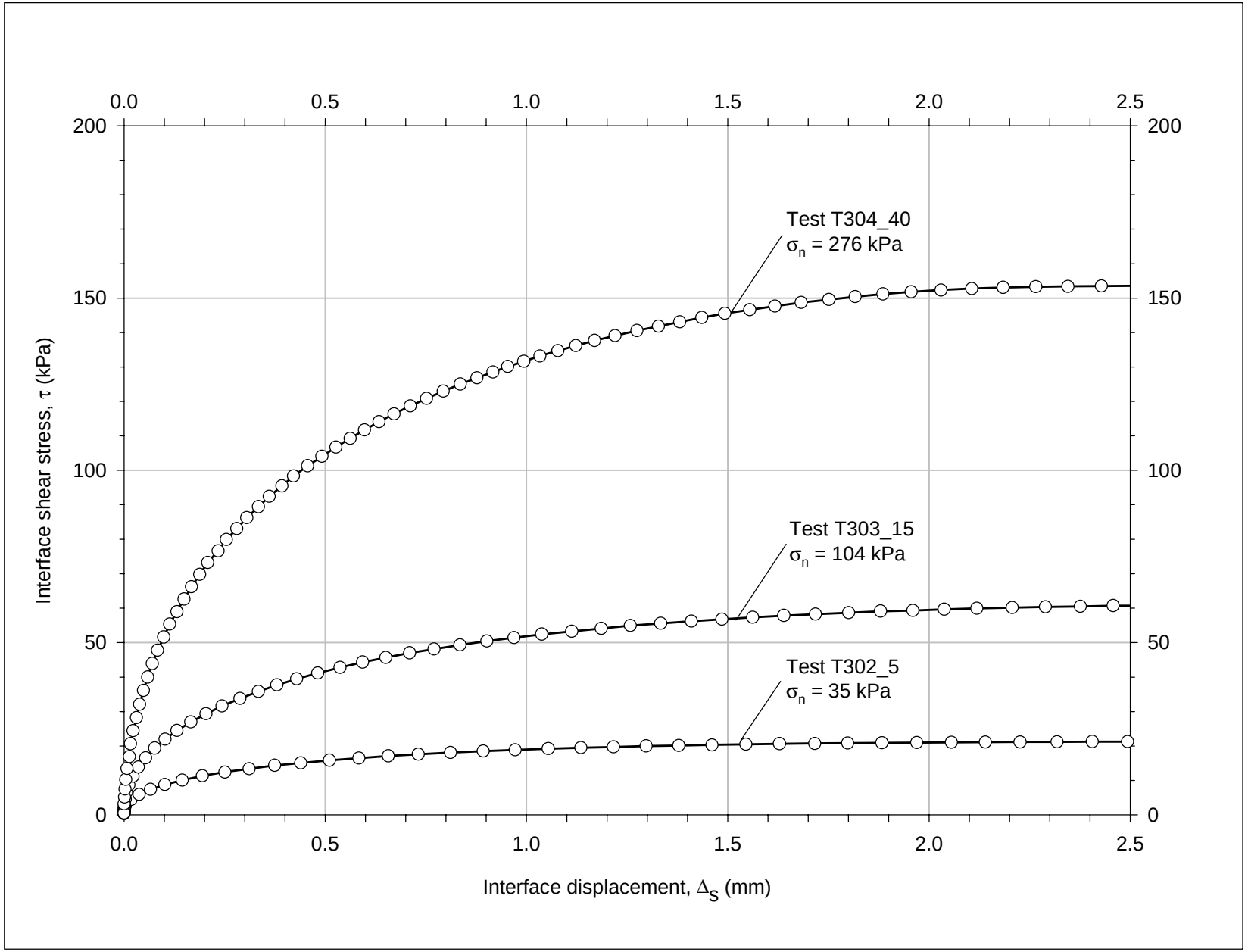
Figure C3. Results of initial loading tests on medium dense Density Sand-to-concrete interface (Sheet 1 of 4)



Notes: - See Figure C3d for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles are omitted

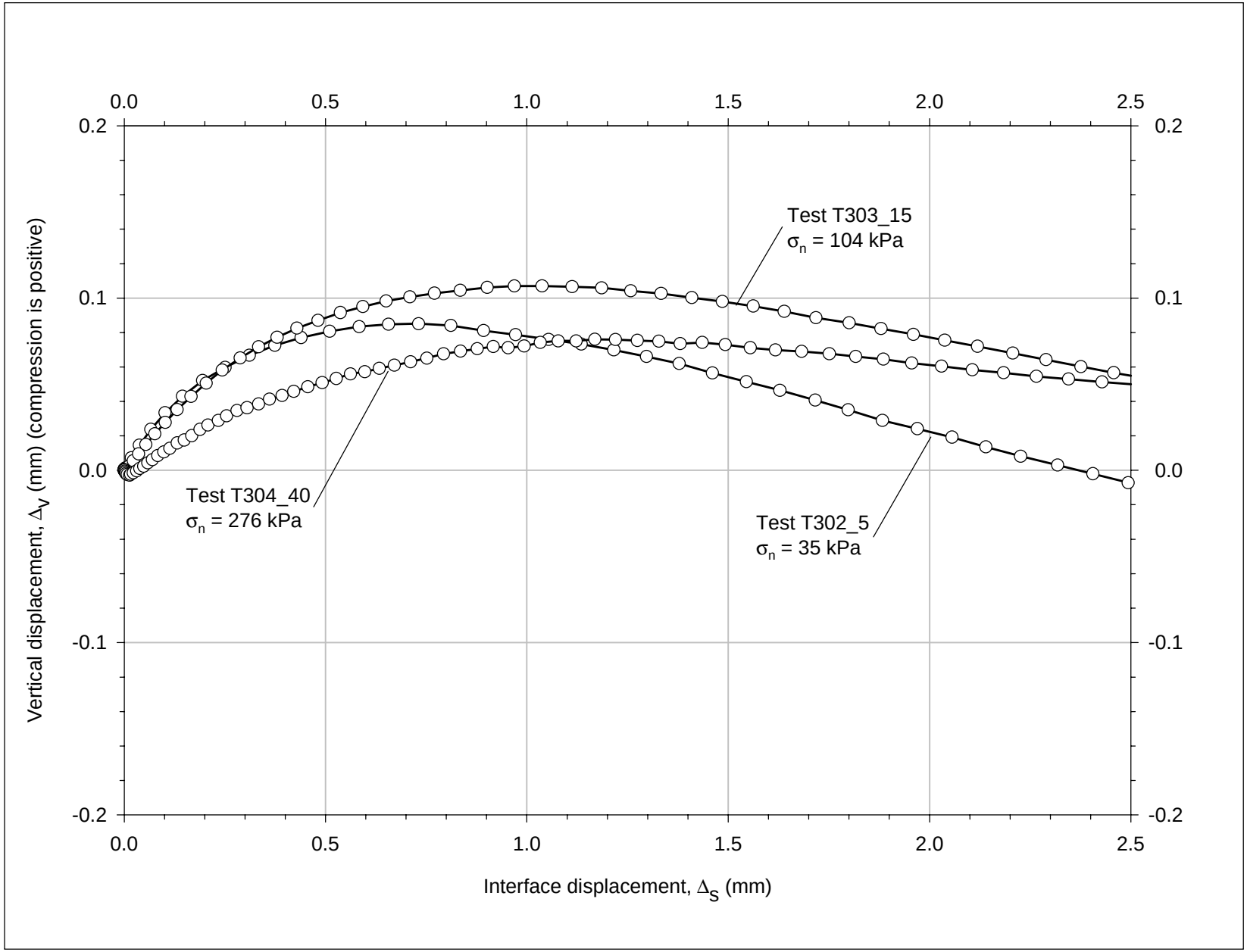
b. Vertical vs. horizontal interface displacement data

Figure C3. (Sheet 2 of 4)



c. Enlargement of Figure C3a

Figure C3. (Sheet 3 of 4)



d. Enlargement of Figure C3b

Figure C3. (Sheet 4 of 4)

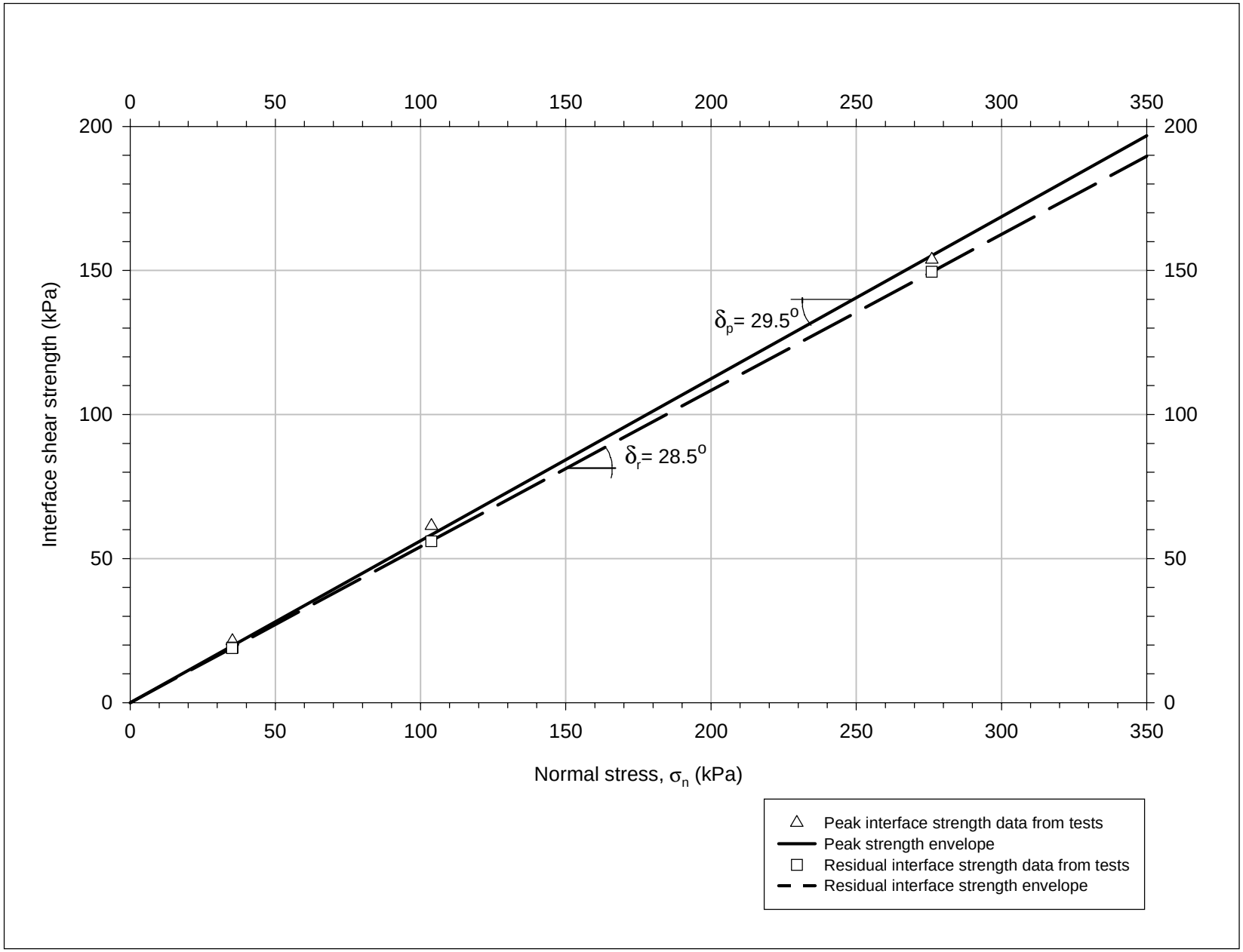
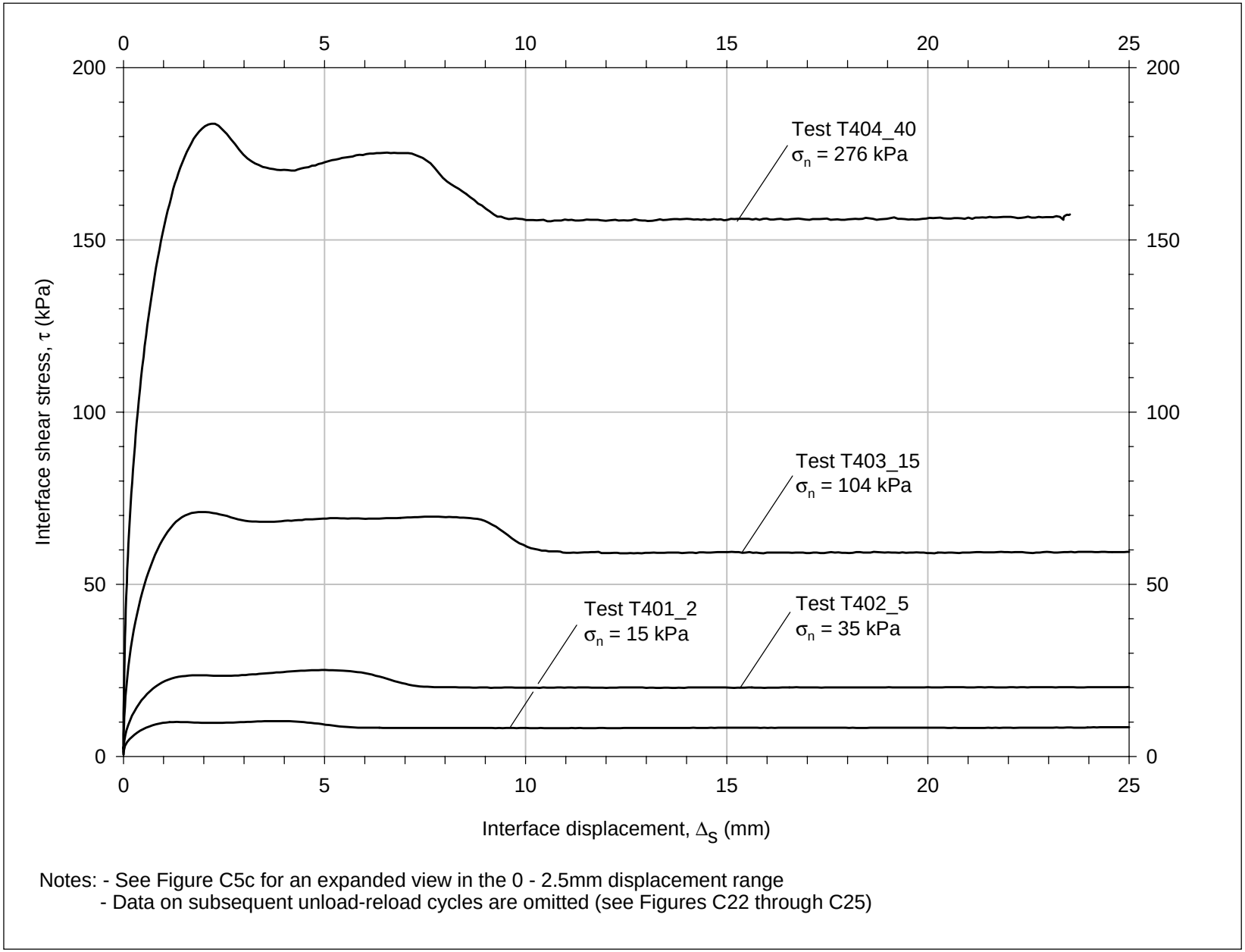


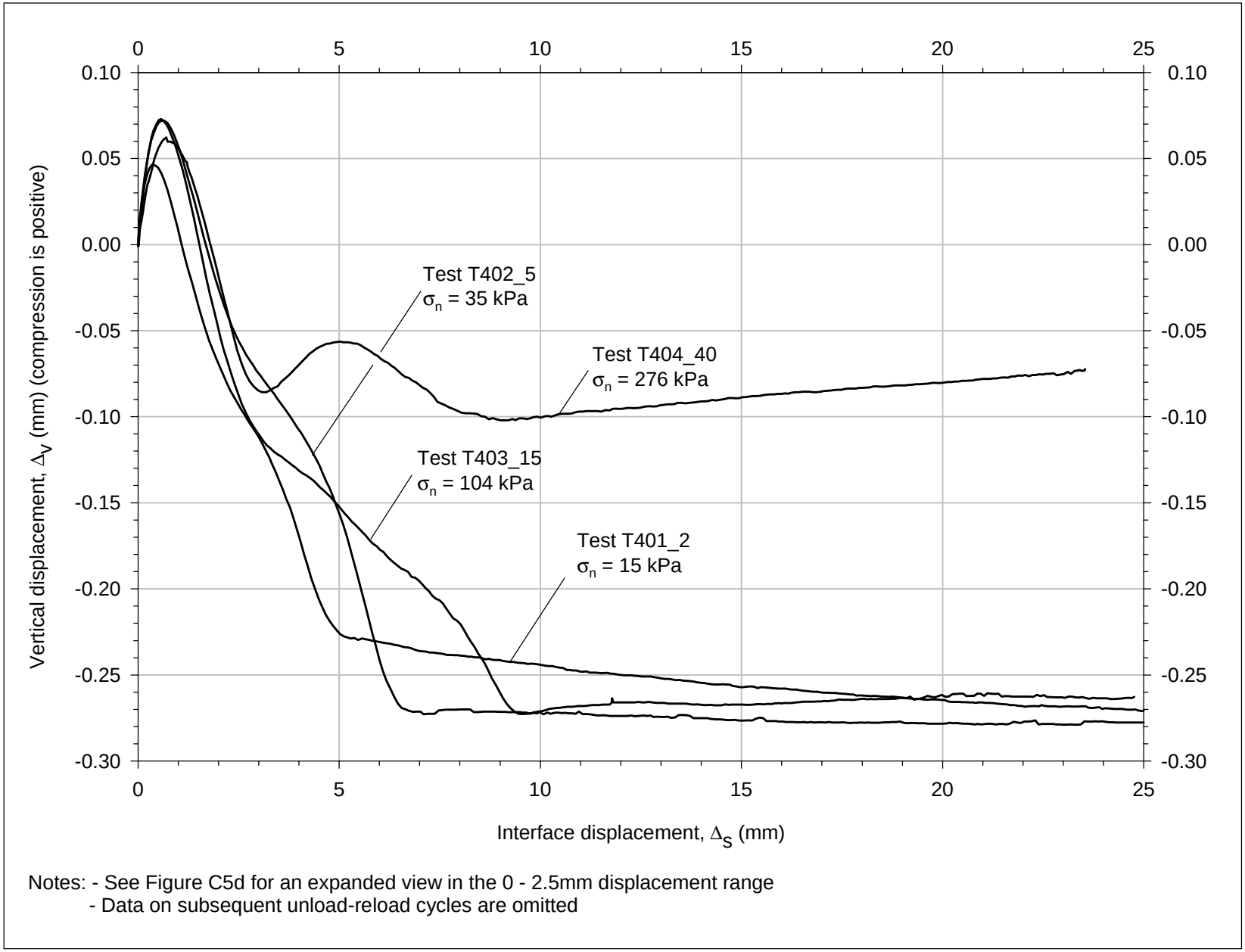
Figure C4. Peak and residual shear strength envelopes for initial loading on medium dense Density Sand-to-concrete interface.



Notes: - See Figure C5c for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles are omitted (see Figures C22 through C25)

a. Shear stress vs. interface displacement data

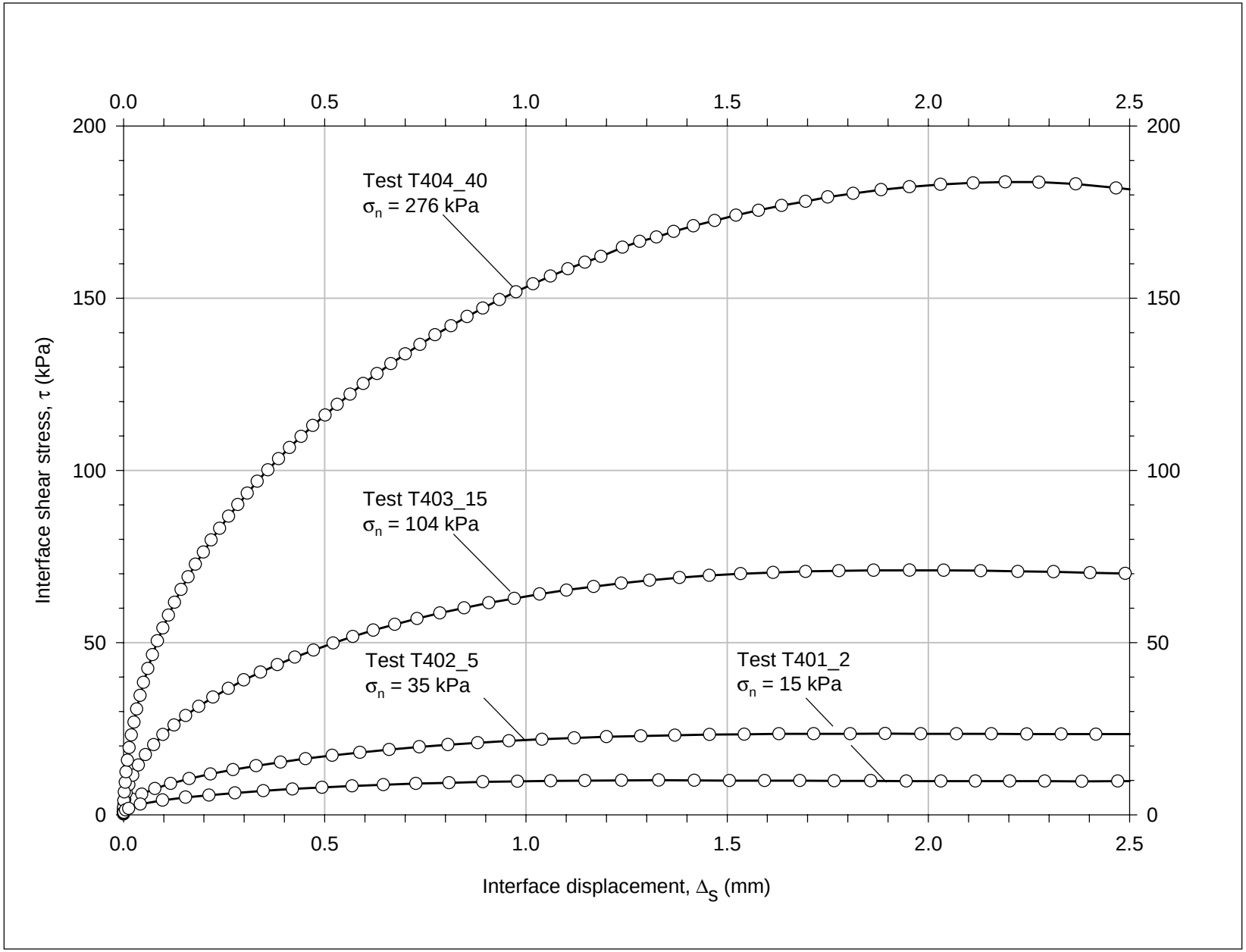
Figure C5. Results of initial loading tests on dense Light Castle Sand-to-concrete interface (Sheet 1 of 4)



Notes: - See Figure C5d for an expanded view in the 0 - 2.5mm displacement range
- Data on subsequent unload-reload cycles are omitted

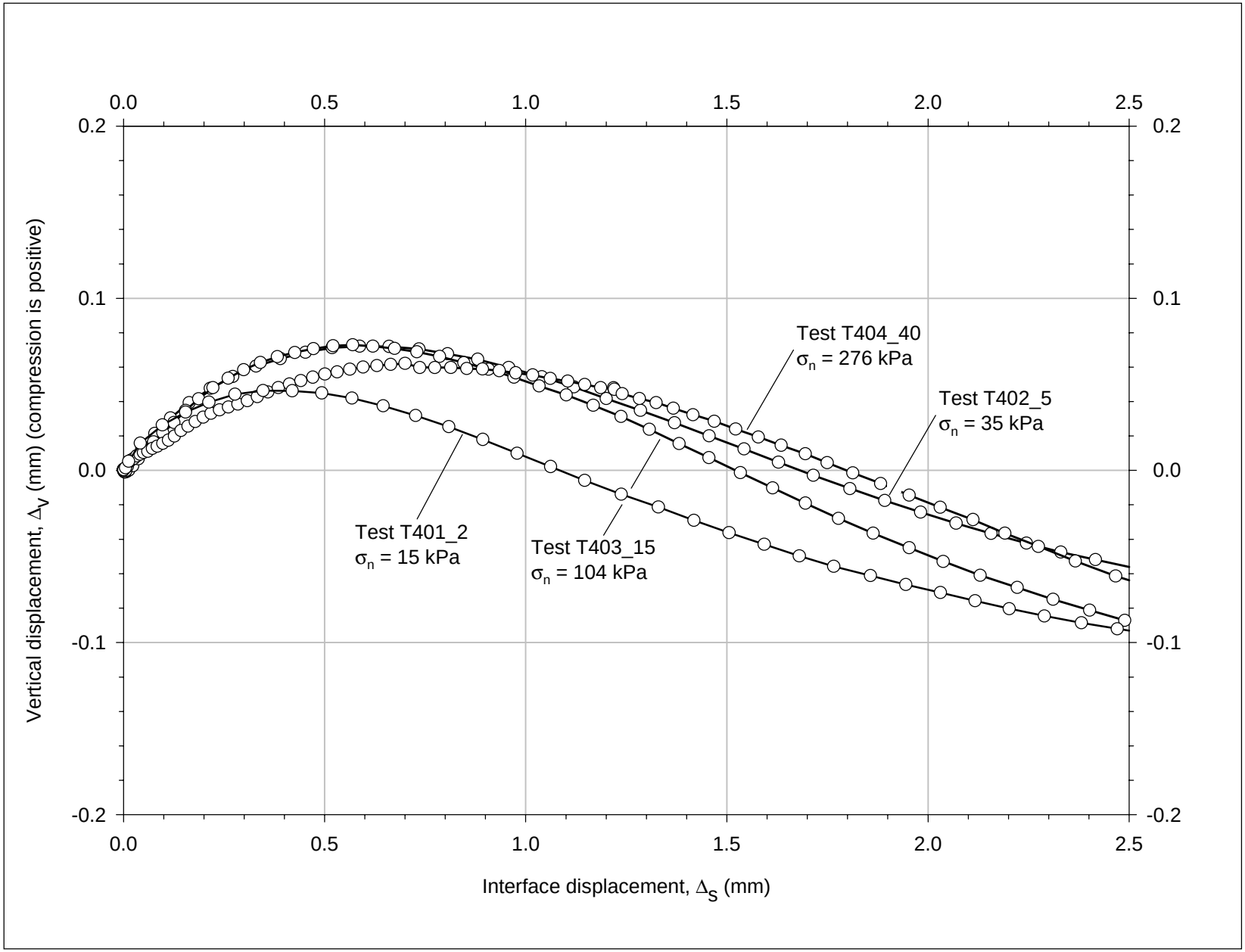
b. Vertical vs. horizontal interface displacement data

Figure C5. (Sheet 2 of 4)



c. Enlargement of Figure C5a

Figure C5. (Sheet 3 of 4)



d. Enlargement of Figure C5b

Figure C5. (Sheet 4 of 4)

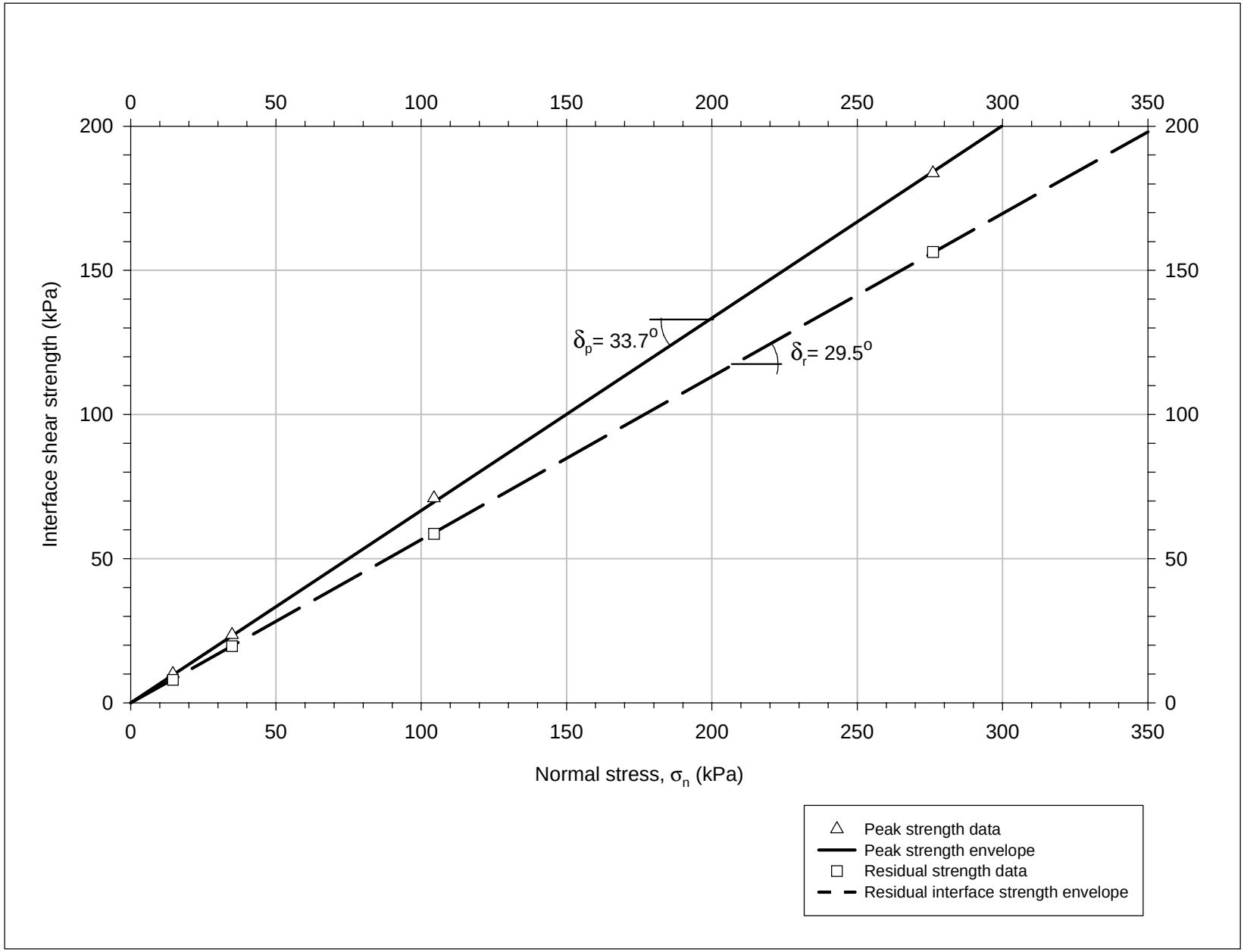
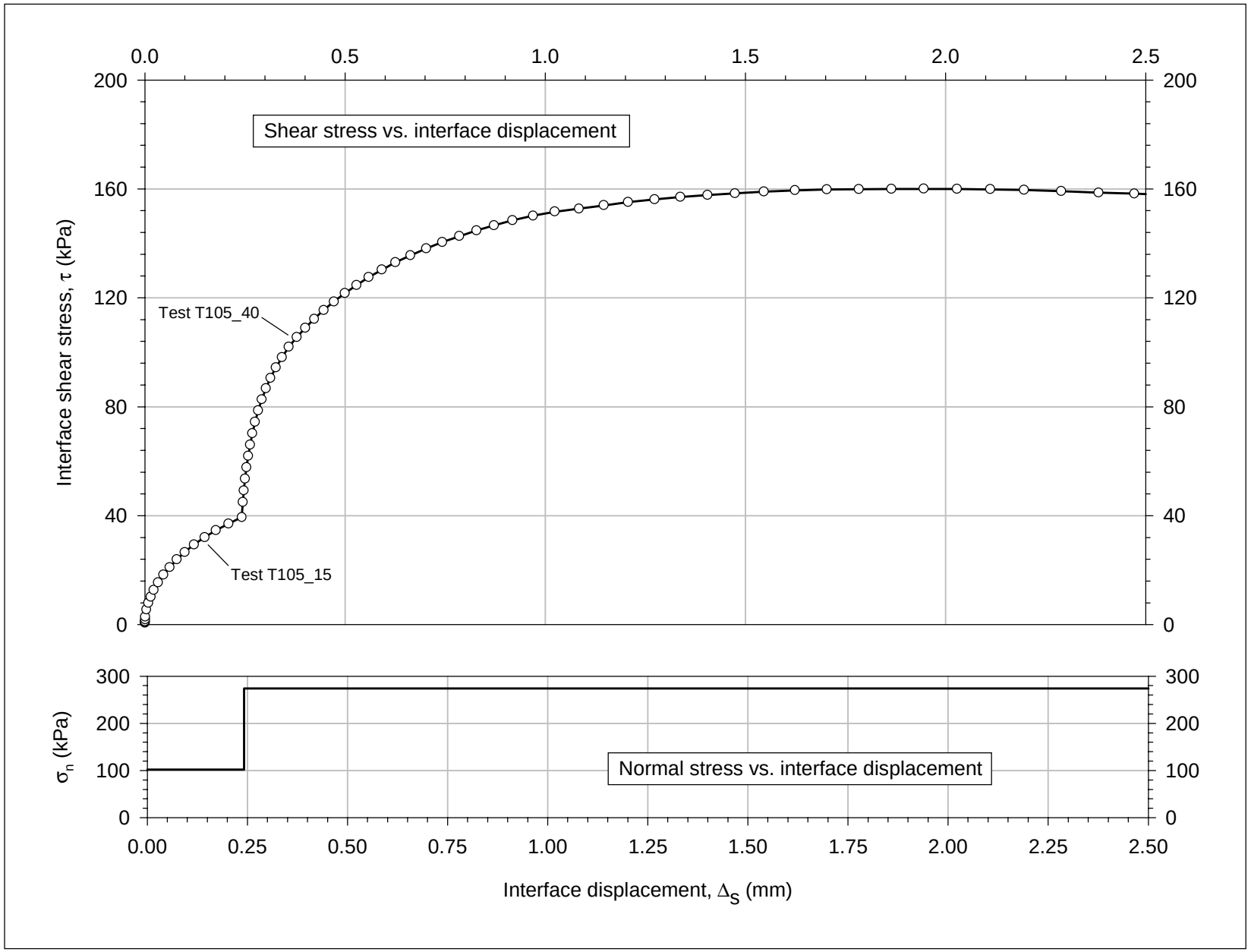
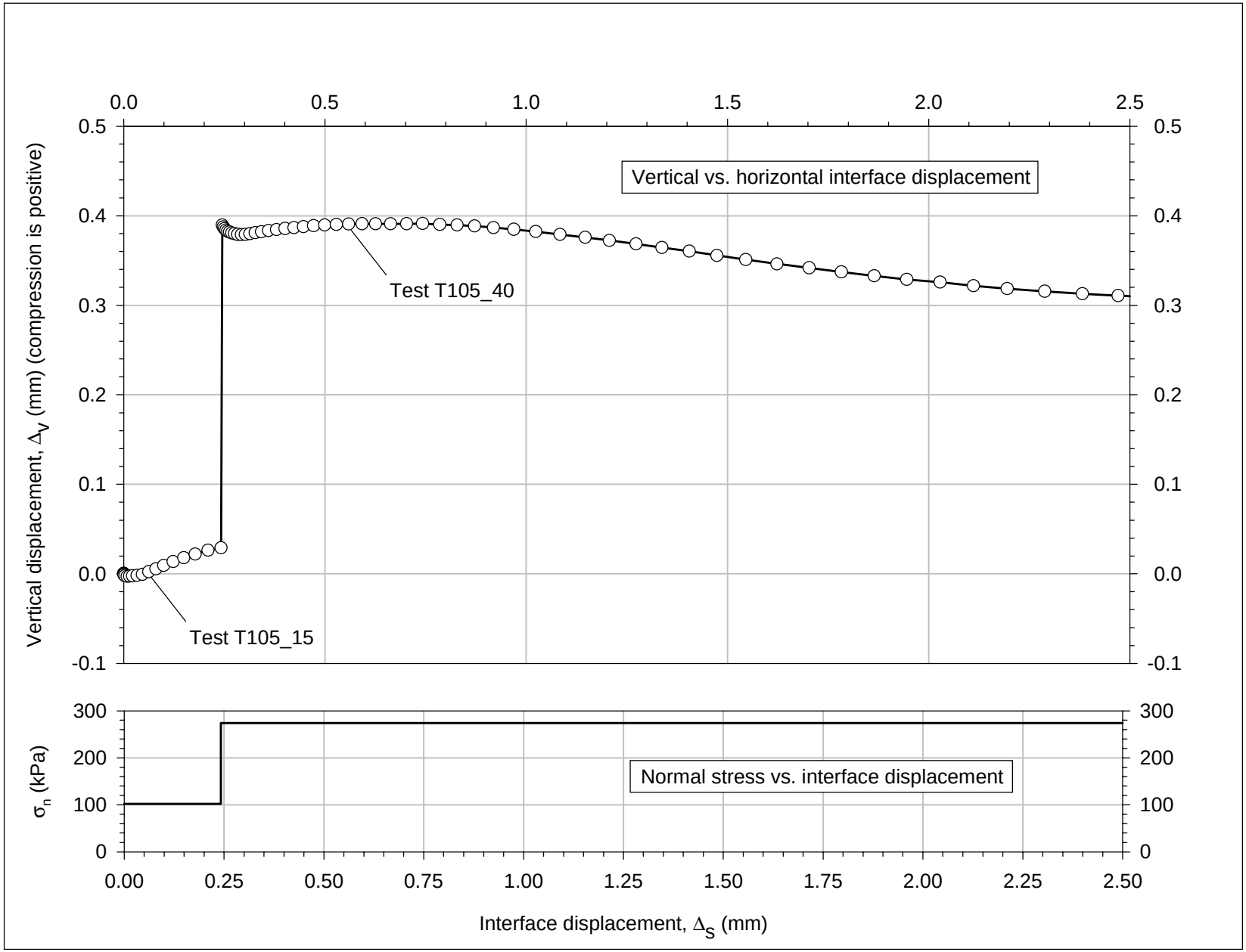


Figure C6. Peak and residual shear strength envelopes for initial loading on dense Light Castle Sand-to-concrete interface.



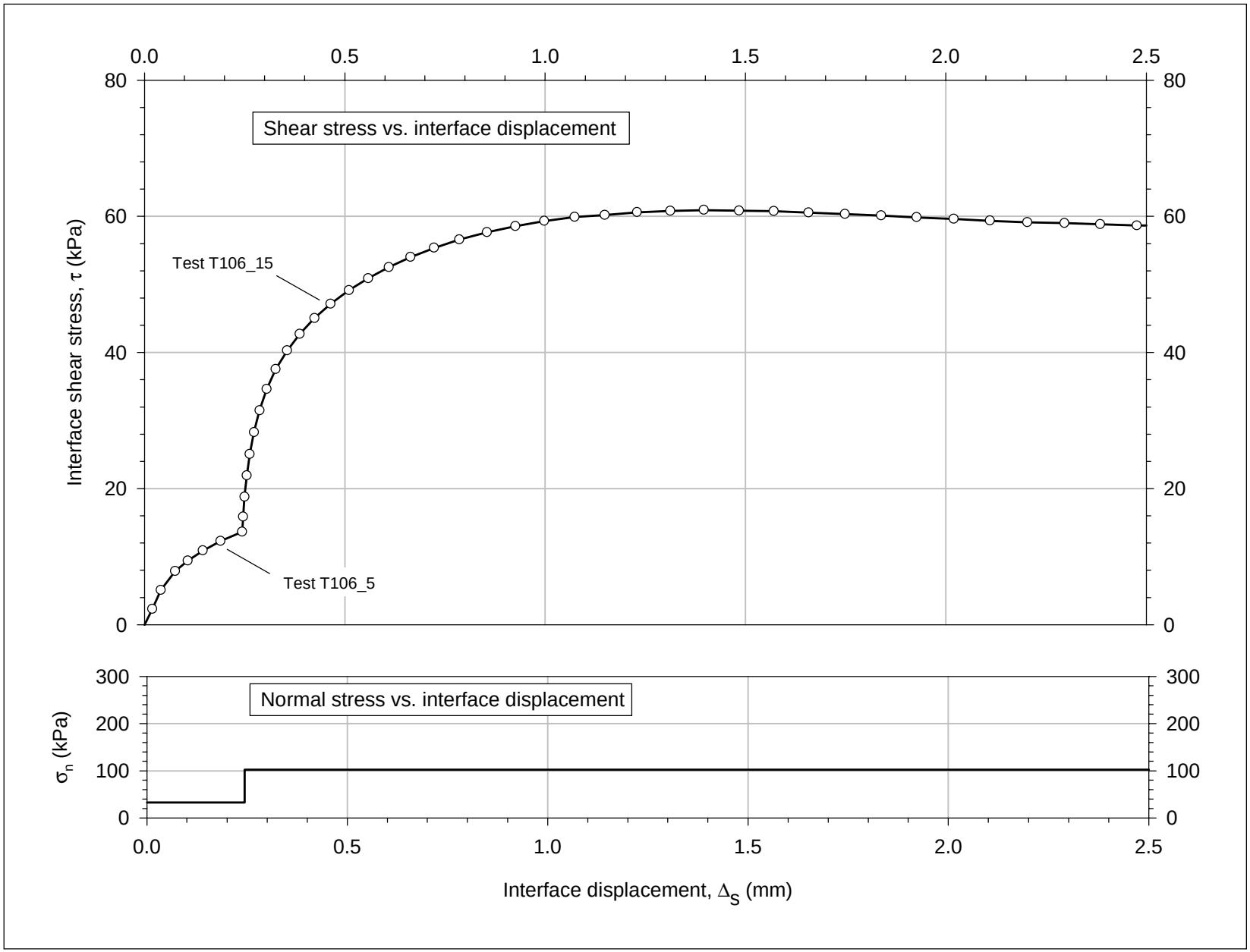
a. Shear stress vs. interface displacement data

Figure C7. Staged test on dense Density Sand-to-concrete interface. Specimen S105. Data on shear reversals are omitted (Continued)



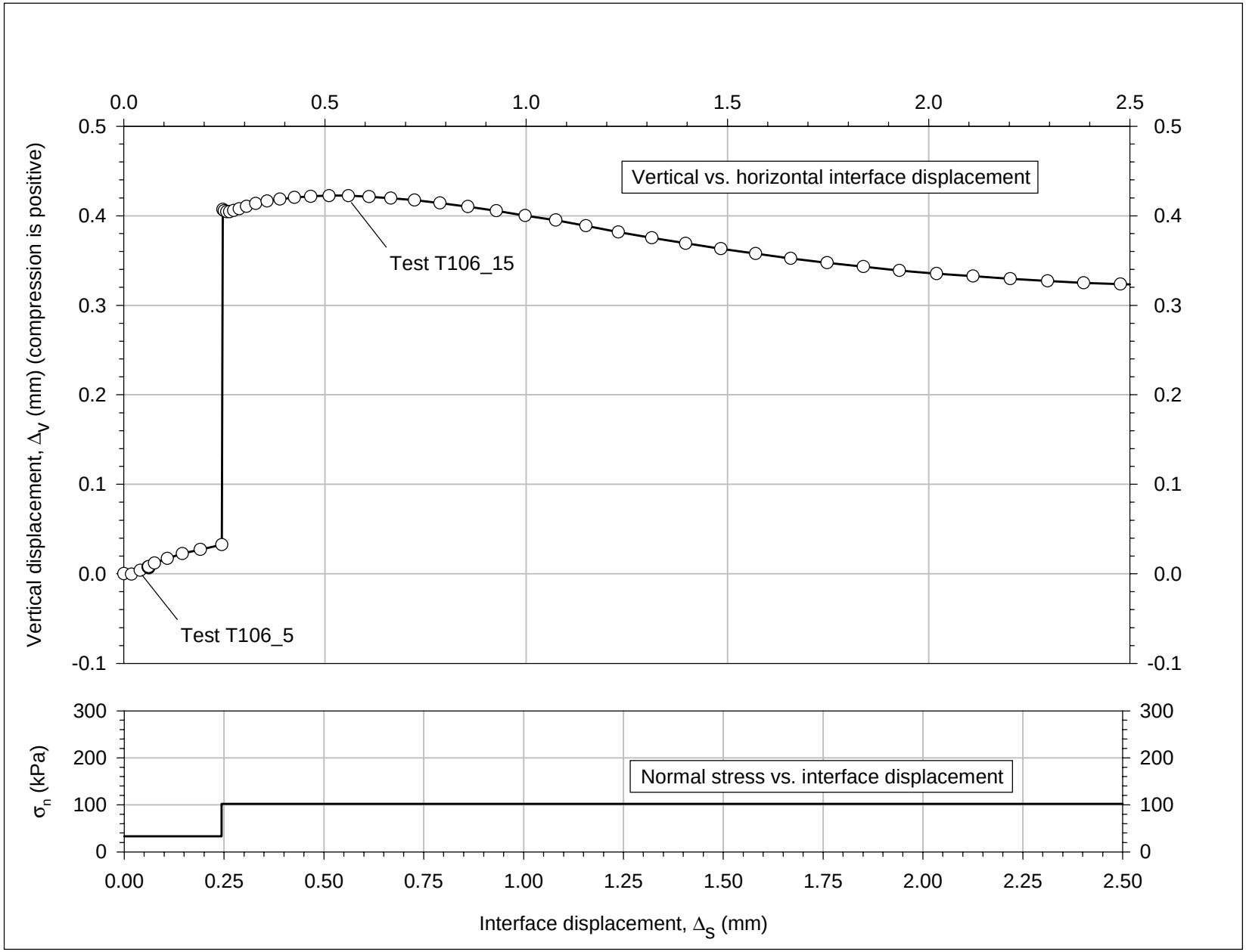
b. Vertical vs. horizontal interface displacement data

Figure C7. (Concluded)



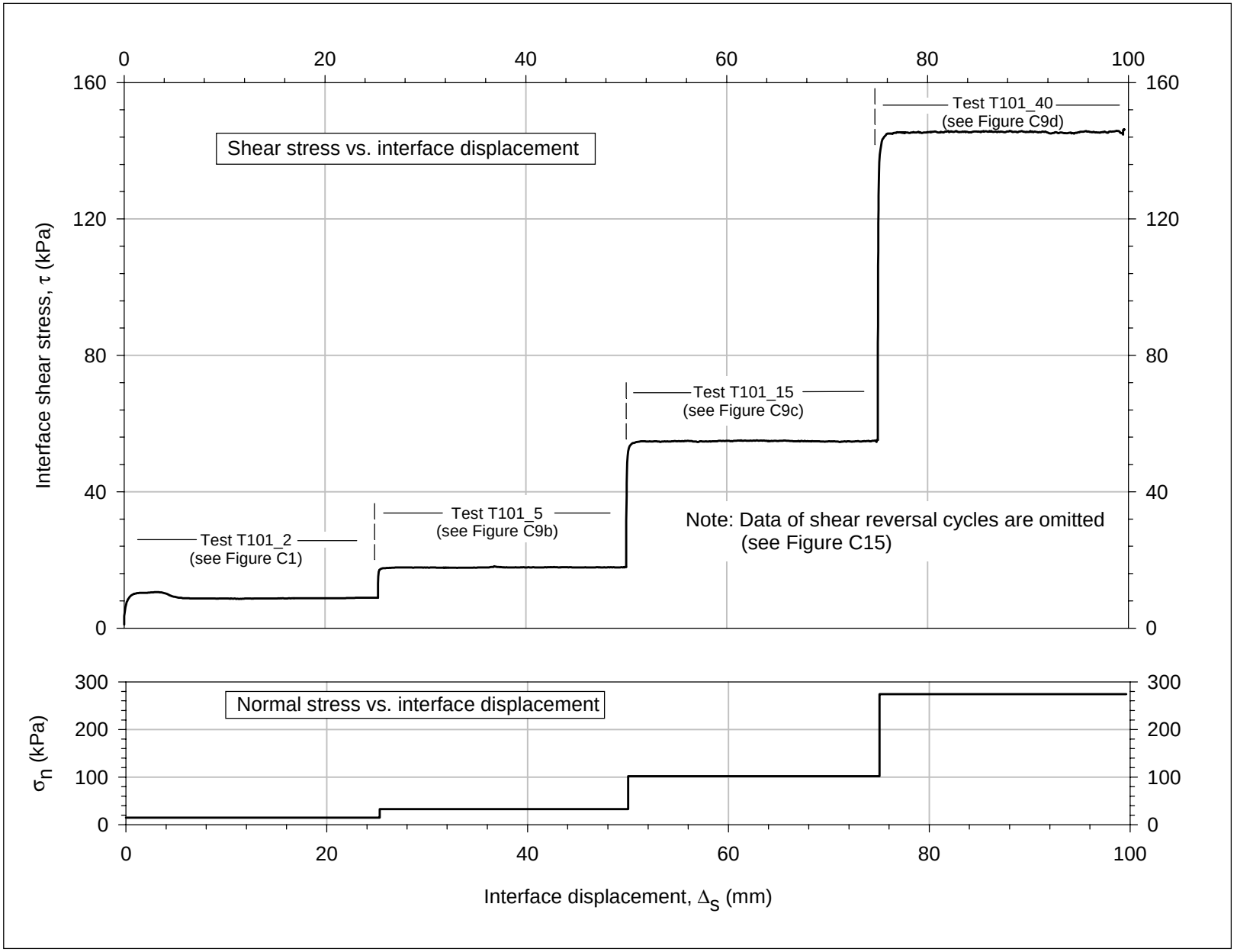
a. Shear stress vs. interface displacement data

Figure C8. Staged test on dense Density Sand-to-concrete interface. Specimen S106. Data on shear reversals are omitted (Continued)



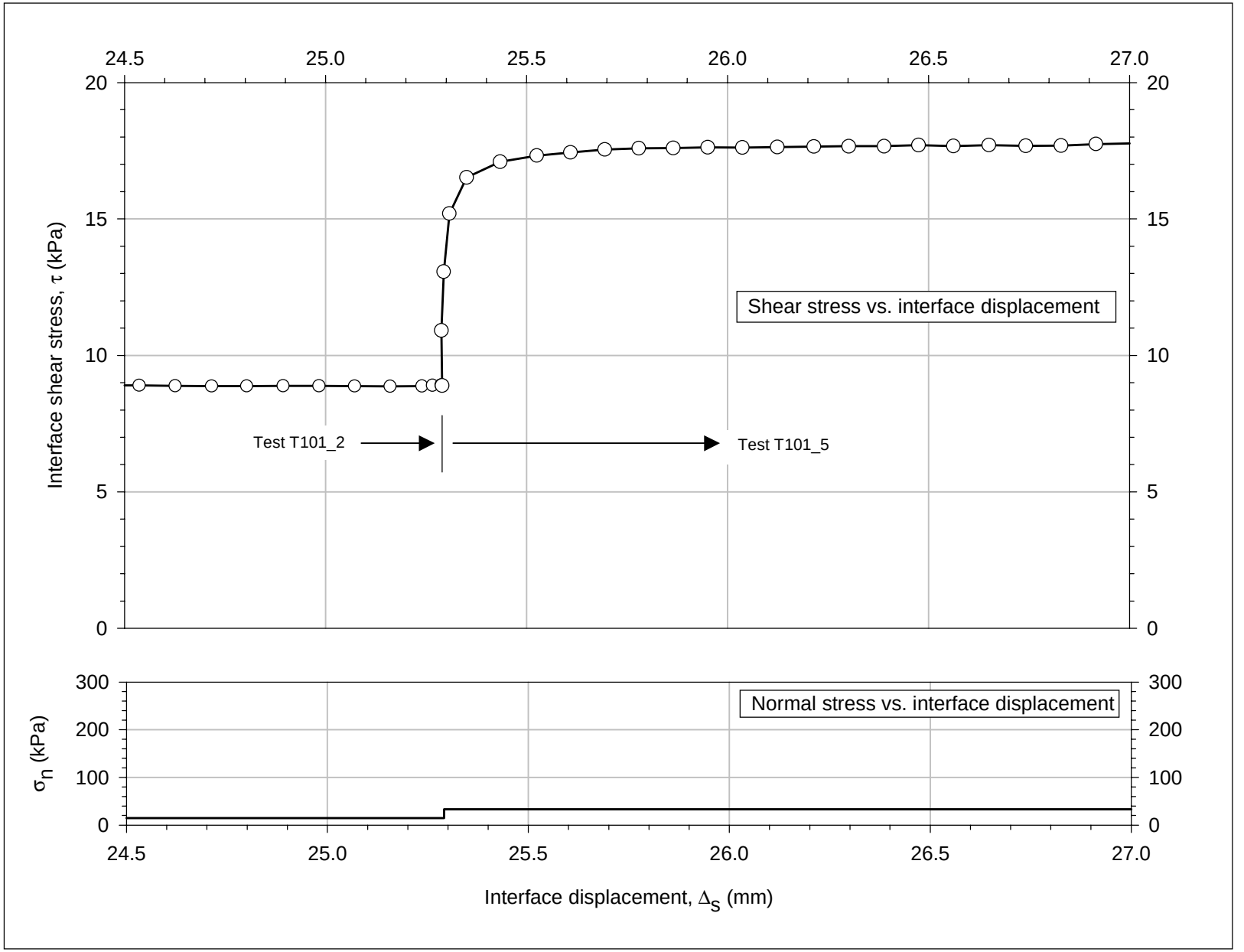
b. Vertical vs. horizontal interface displacement data

Figure C8. (Concluded)



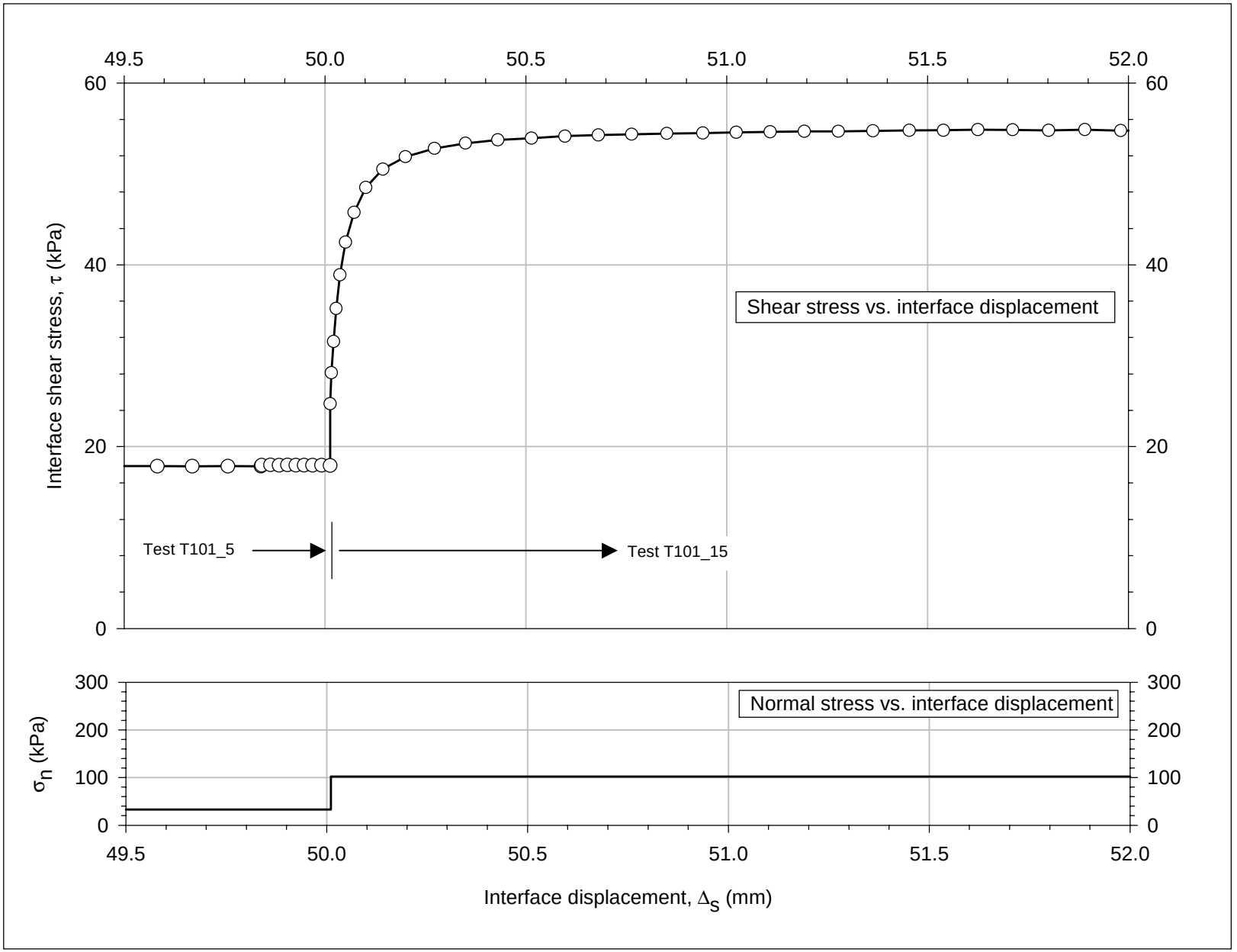
a. Results of all staged tests performed on specimen S101

Figure C9. Staged tests on dense Density Sand-to-concrete interface. Specimen S101 (Sheet 1 of 4)



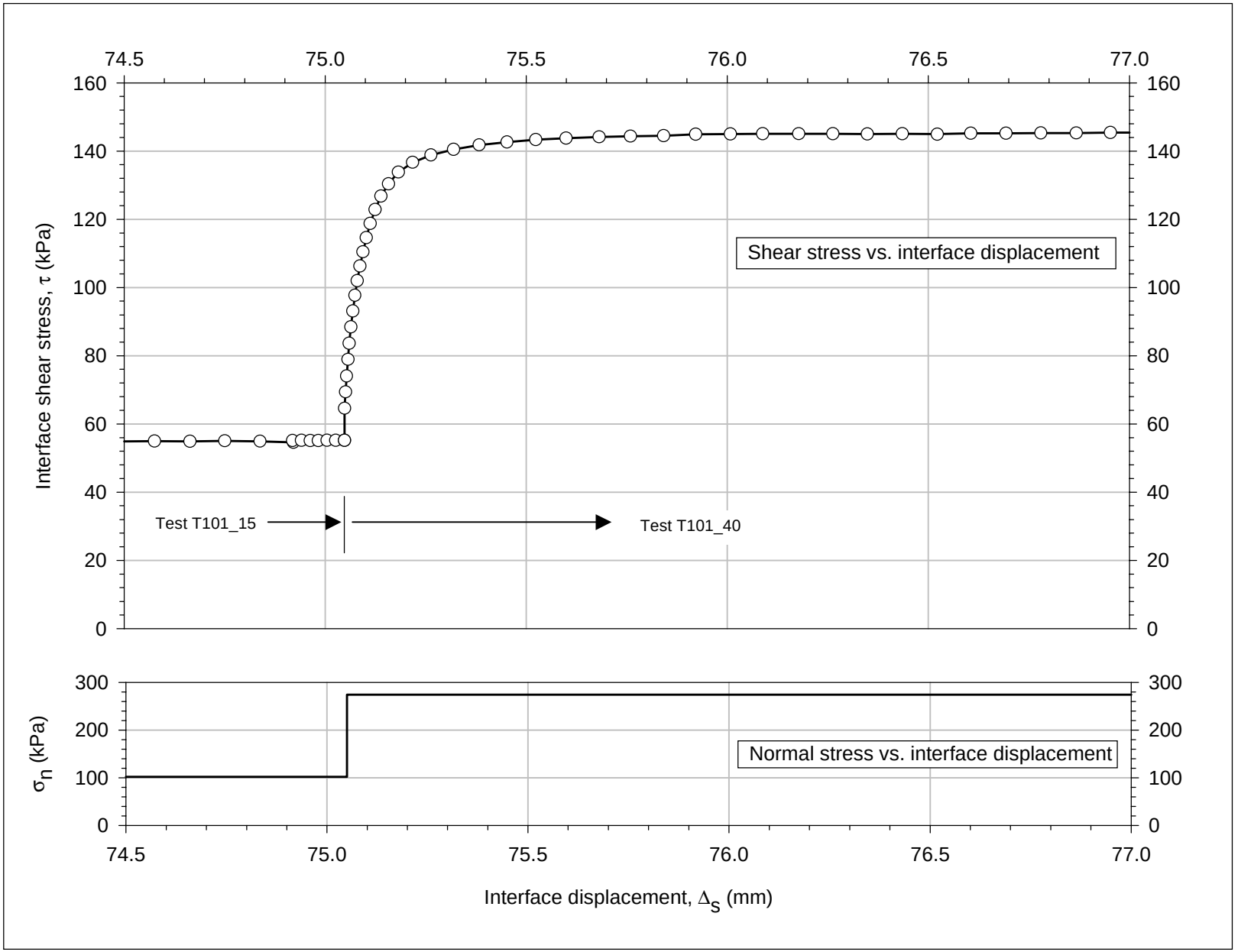
b. Detail of shear stress-displacement response for staged shear test T101_5. Normal stress increased from 15 to 33 kPa

Figure C9. (Sheet 2 of 4)



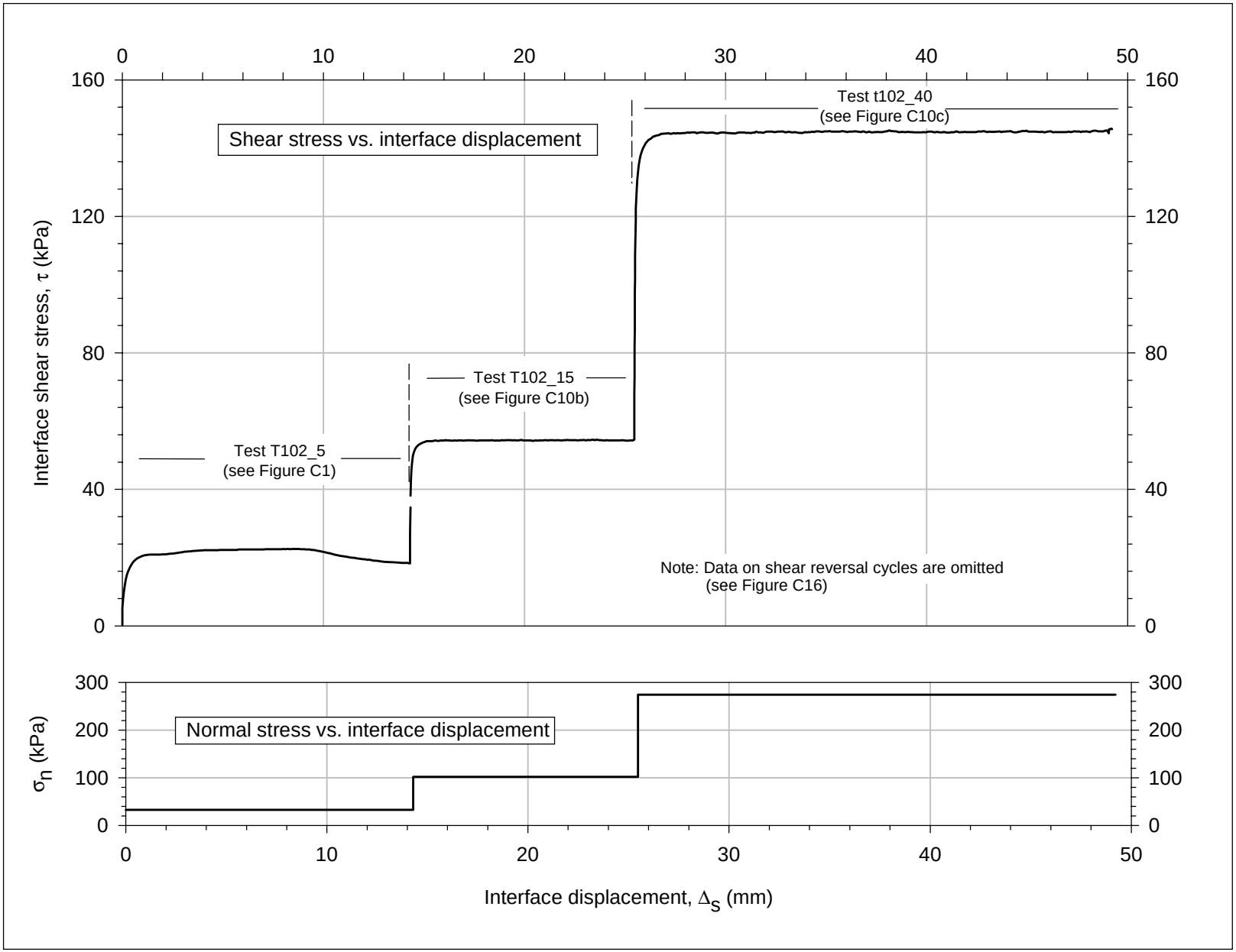
c. Detail of shear stress-displacement response for staged shear test T101_15. Normal stress increased from 33 to 102 kPa

Figure C9. (Sheet 3 of 4)



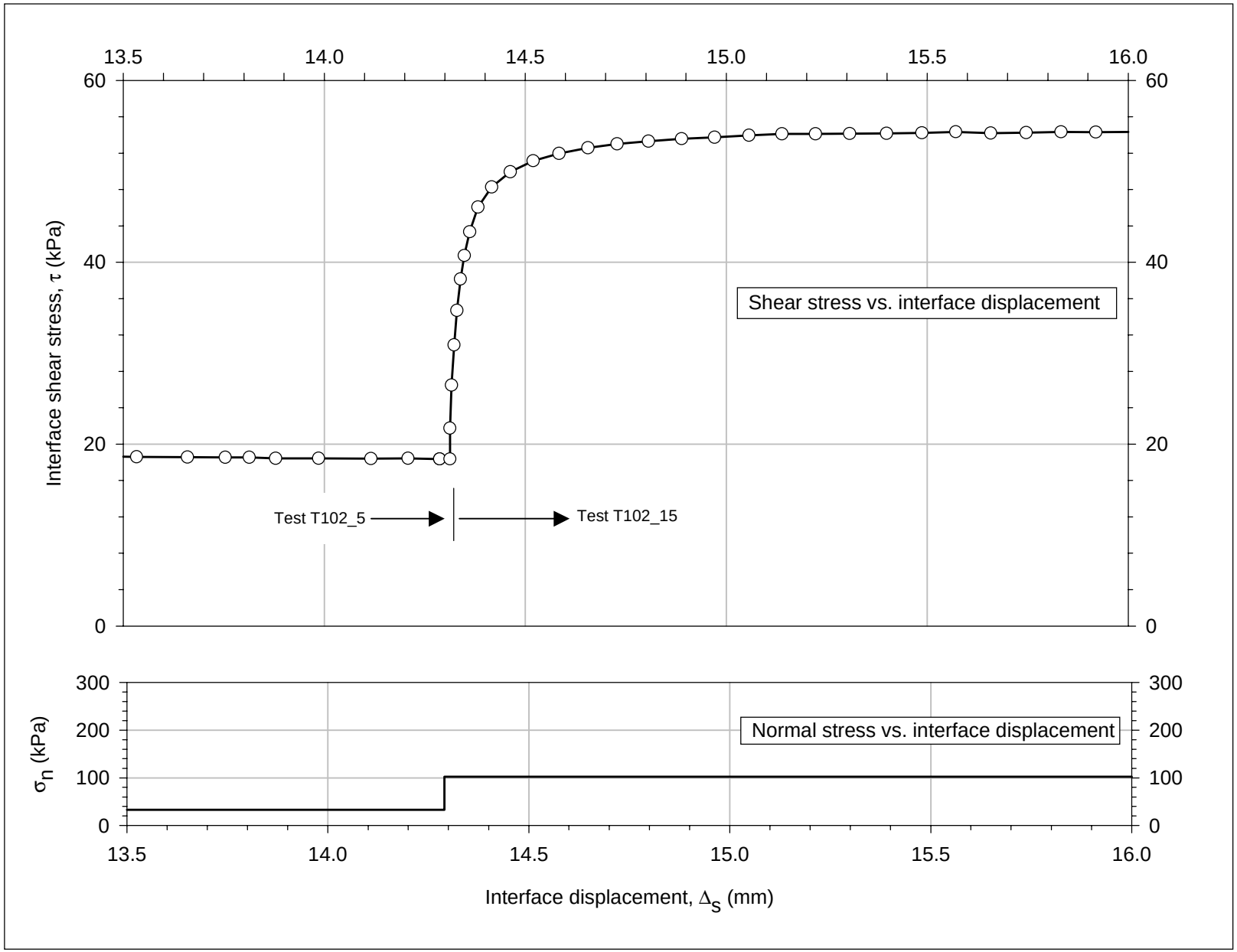
d. Detail of shear stress-displacement response for staged shear test T101_40. Normal stress increased from 102 to 274 kPa

Figure C9. (Sheet 4 of 4)

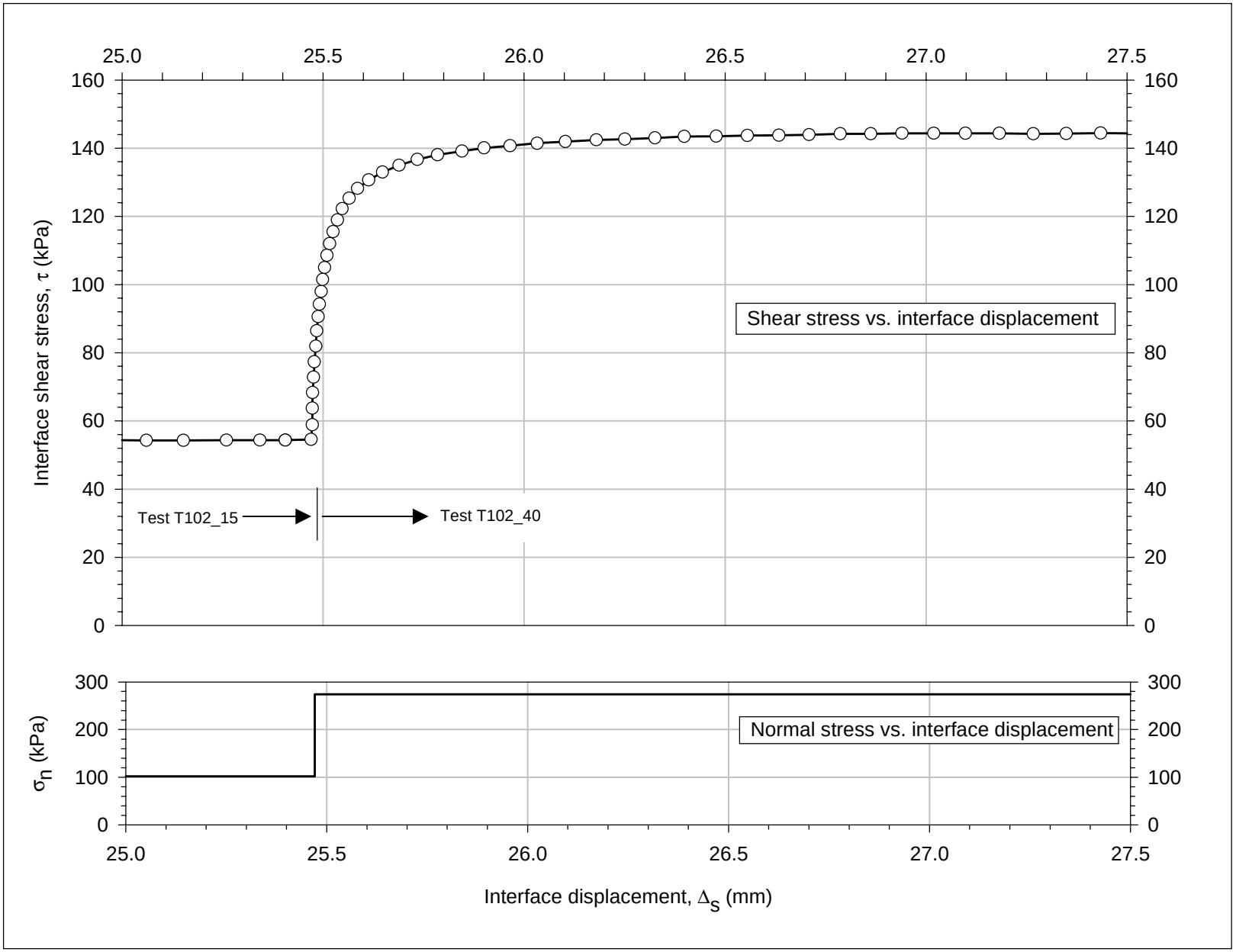


a. Results of all staged tests performed on specimen S102

Figure C10. Staged tests on dense Density Sand-to-concrete interface. Specimen S102 (Sheet 1 of 3)

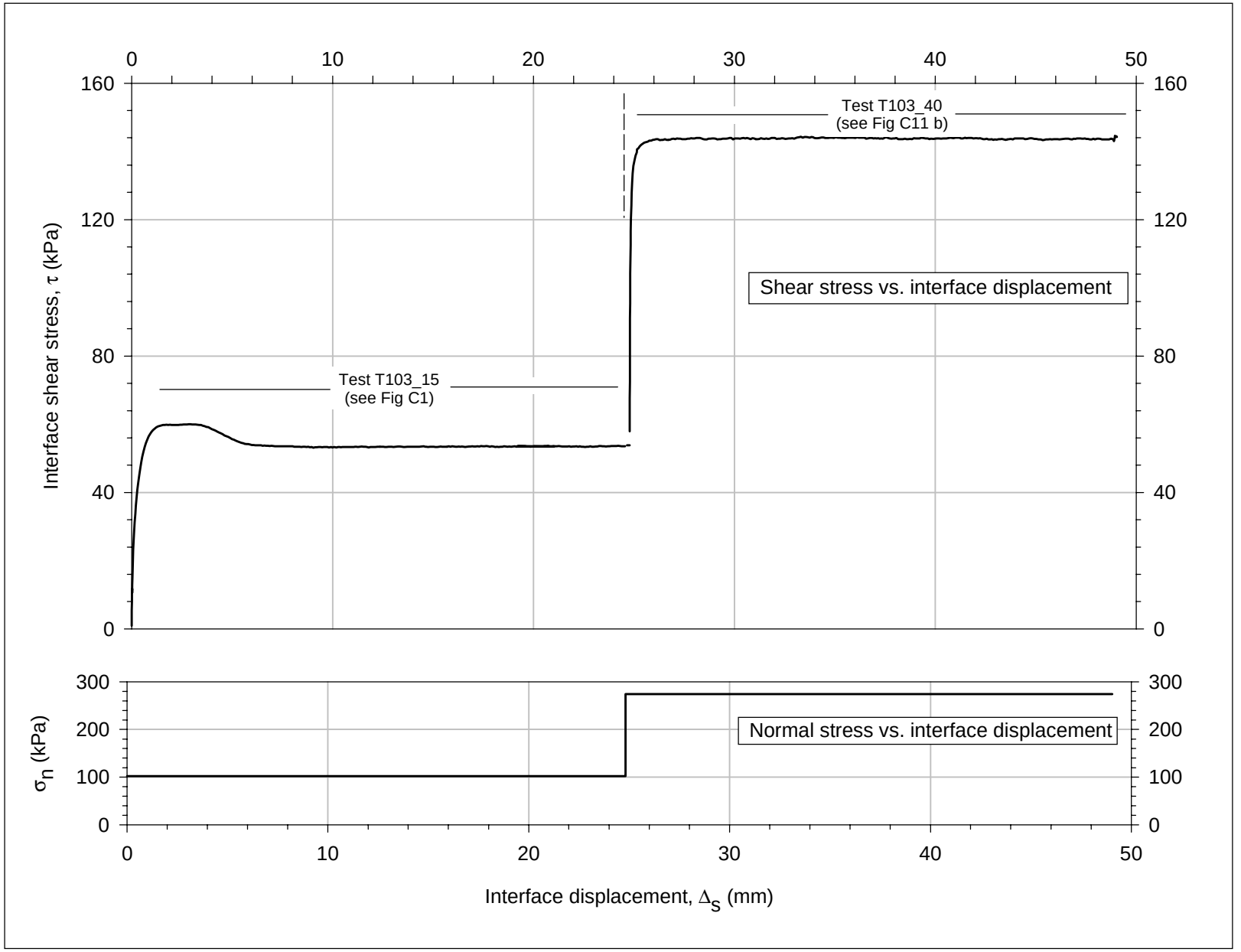


b. Detail of shear stress-displacement response for staged shear test T102_15. Normal stress increased from 33 to 102 kPa
Figure C10. (Sheet 2 of 3)



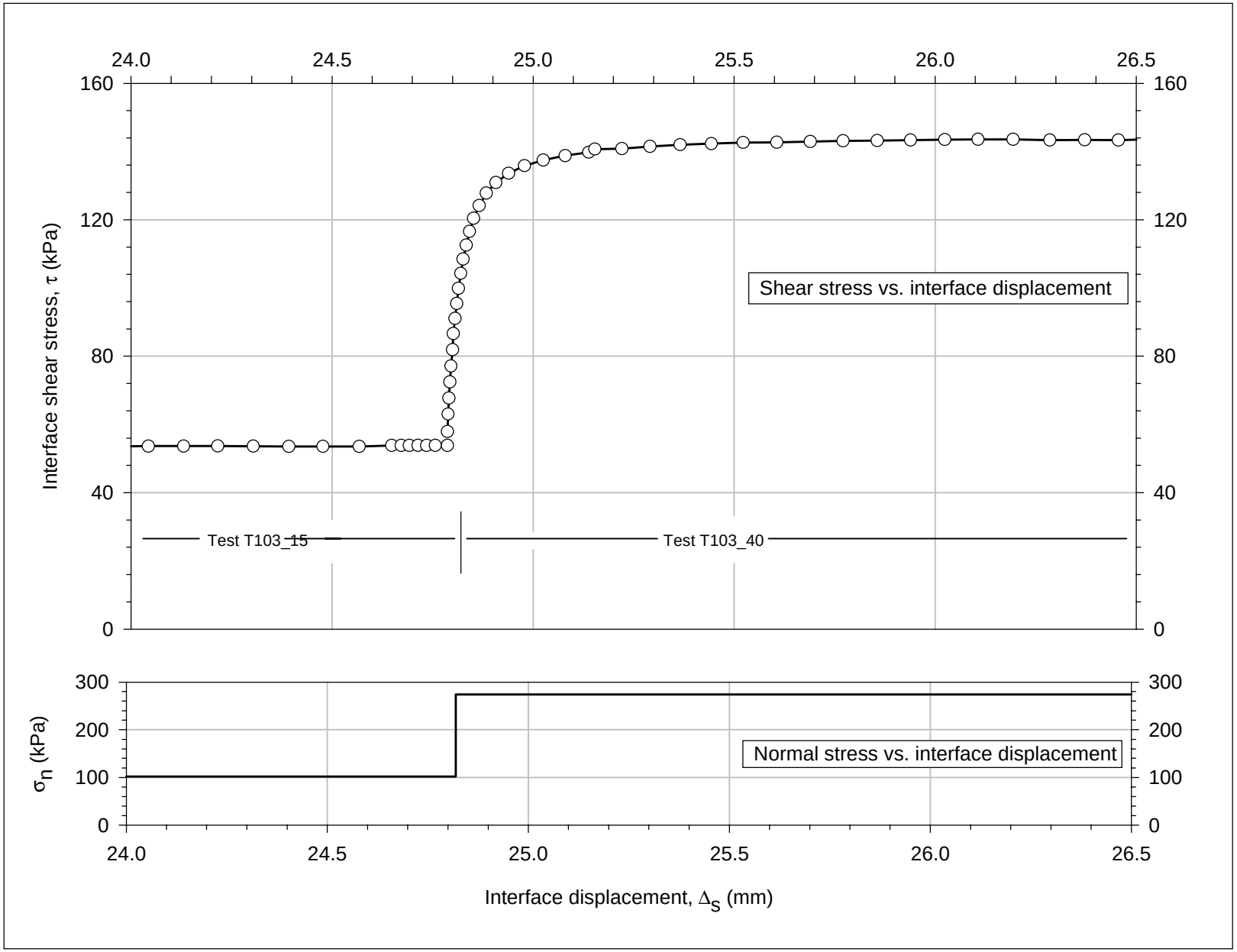
c. Detail of shear stress-displacement response for staged shear test T102_40. Normal stress increased from 102 to 274 kPa

Figure C10. (Sheet 3 of 3)



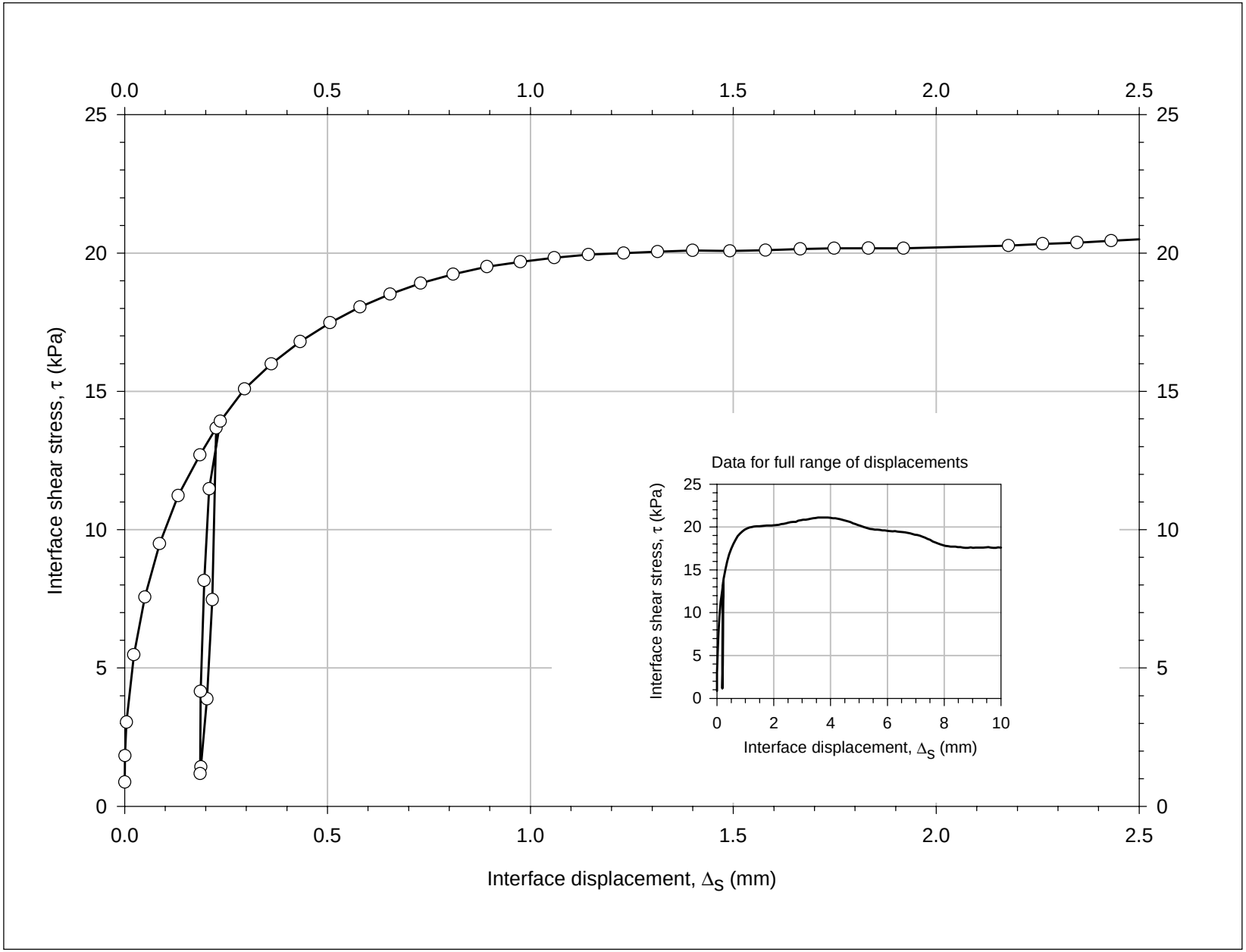
a. Results of all staged tests performed on specimen S103

Figure C11. Staged tests on dense Density Sand-to-concrete interface. Specimen S103 (Continued)



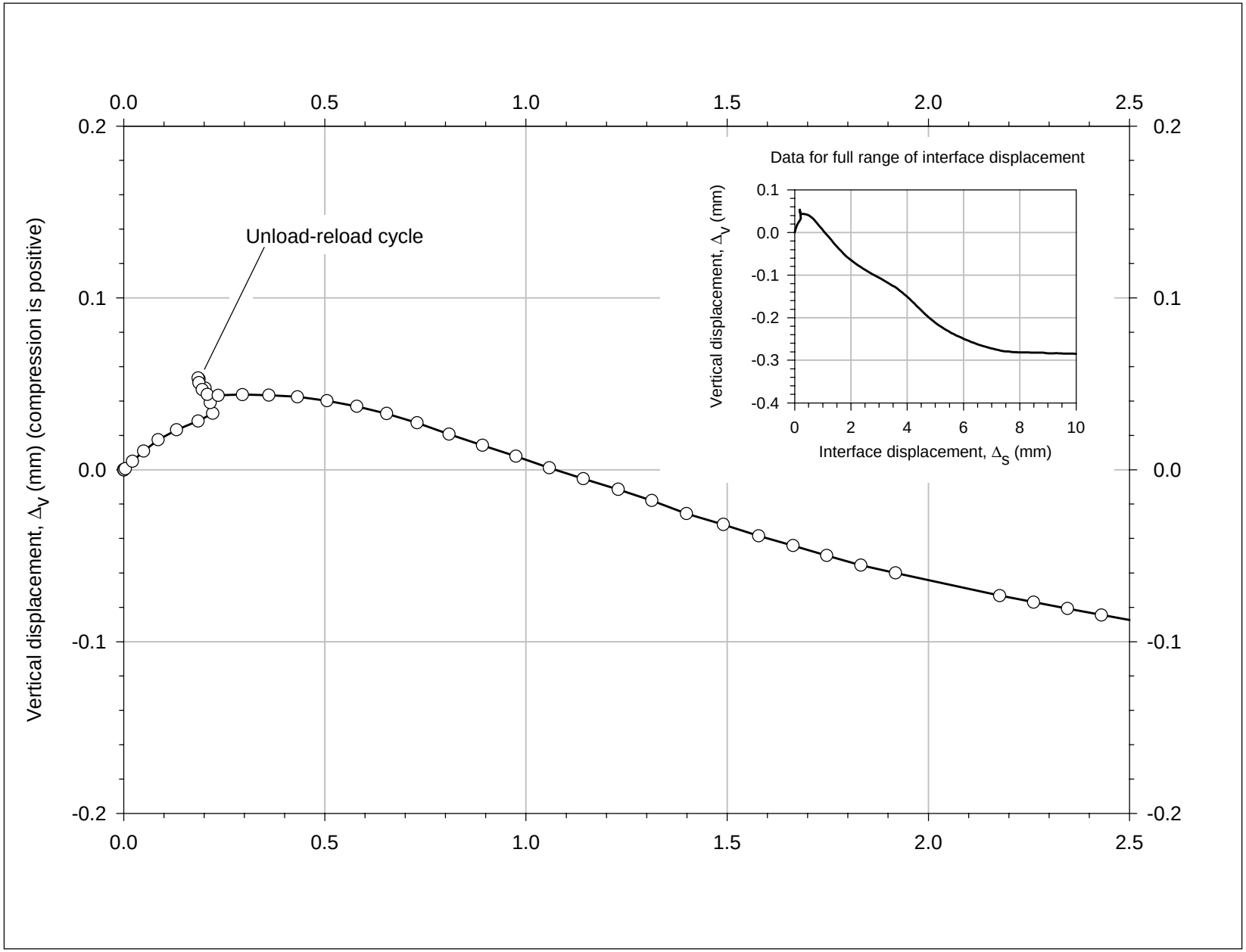
b. Detail of shear stress-displacement response for staged shear test T103_40. Normal stress increased from 102 to 274 kPa

Figure C11. (Concluded)



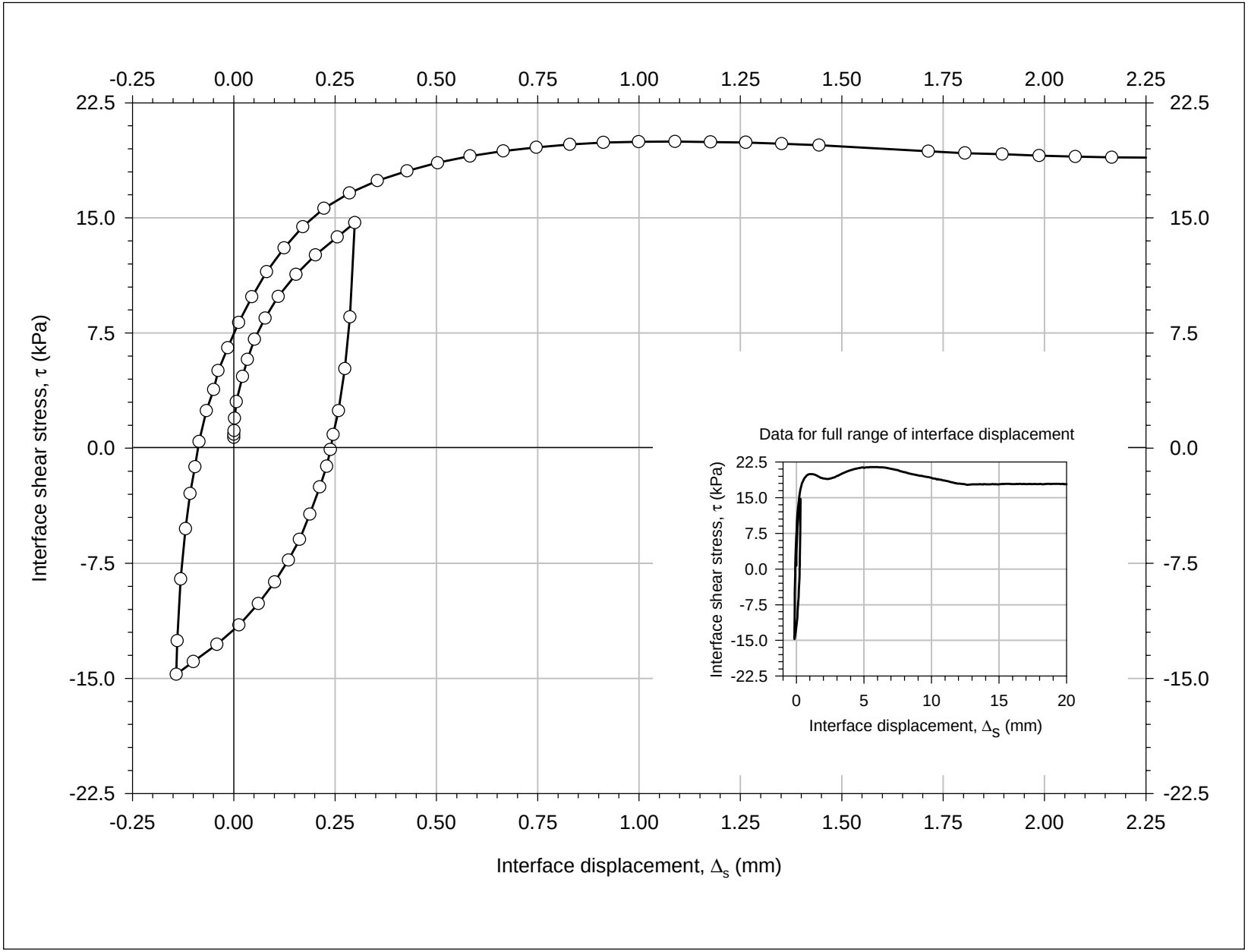
a. Detail of unload reload cycle. Inset shows data for full range of interface displacement

Figure C12. Unload-reload test on dense Density Sand-to-concrete interface, σ_n=33 kPa, specimen S201 (Continued)



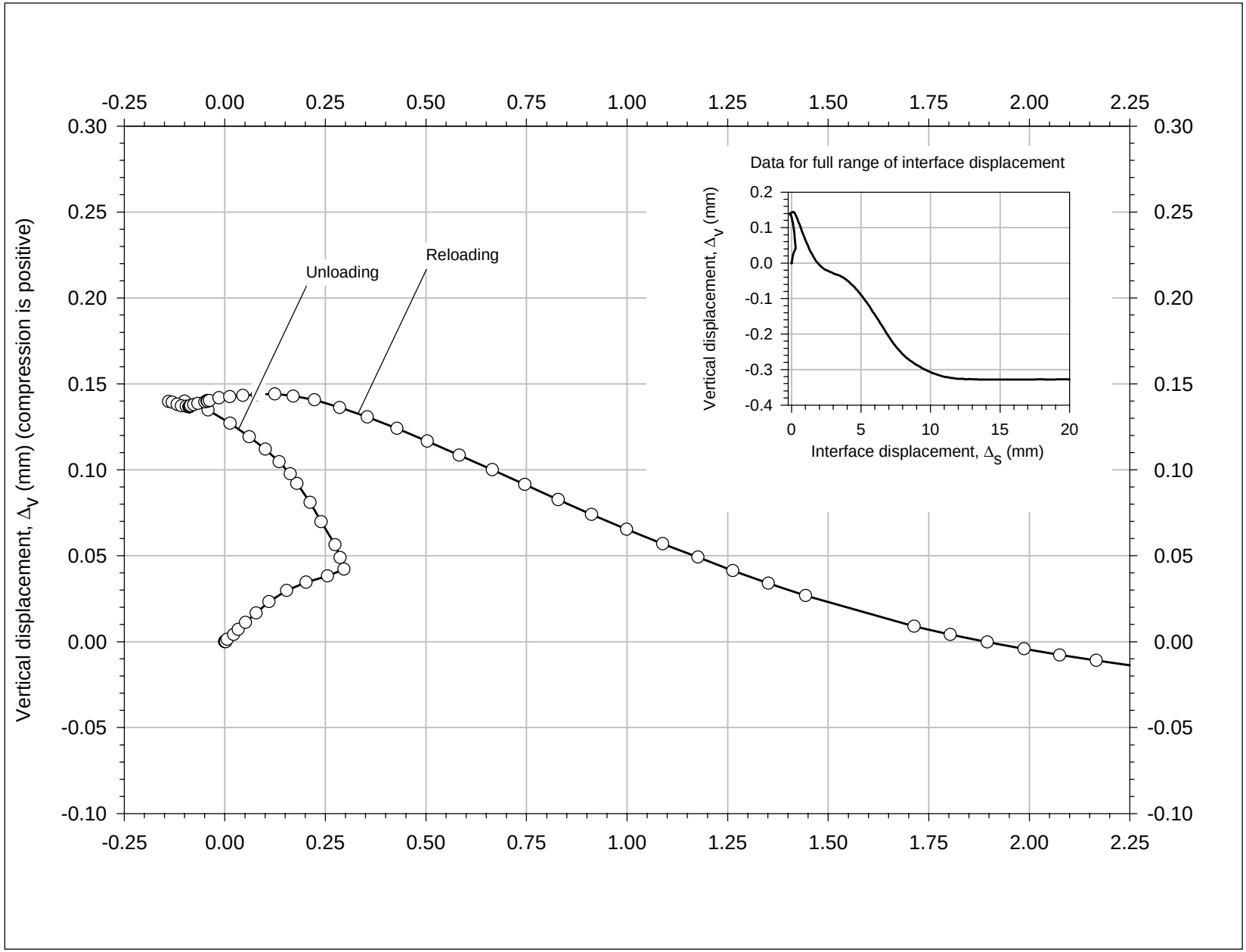
b. Vertical vs. horizontal interface displacement data

Figure C12. (Concluded)



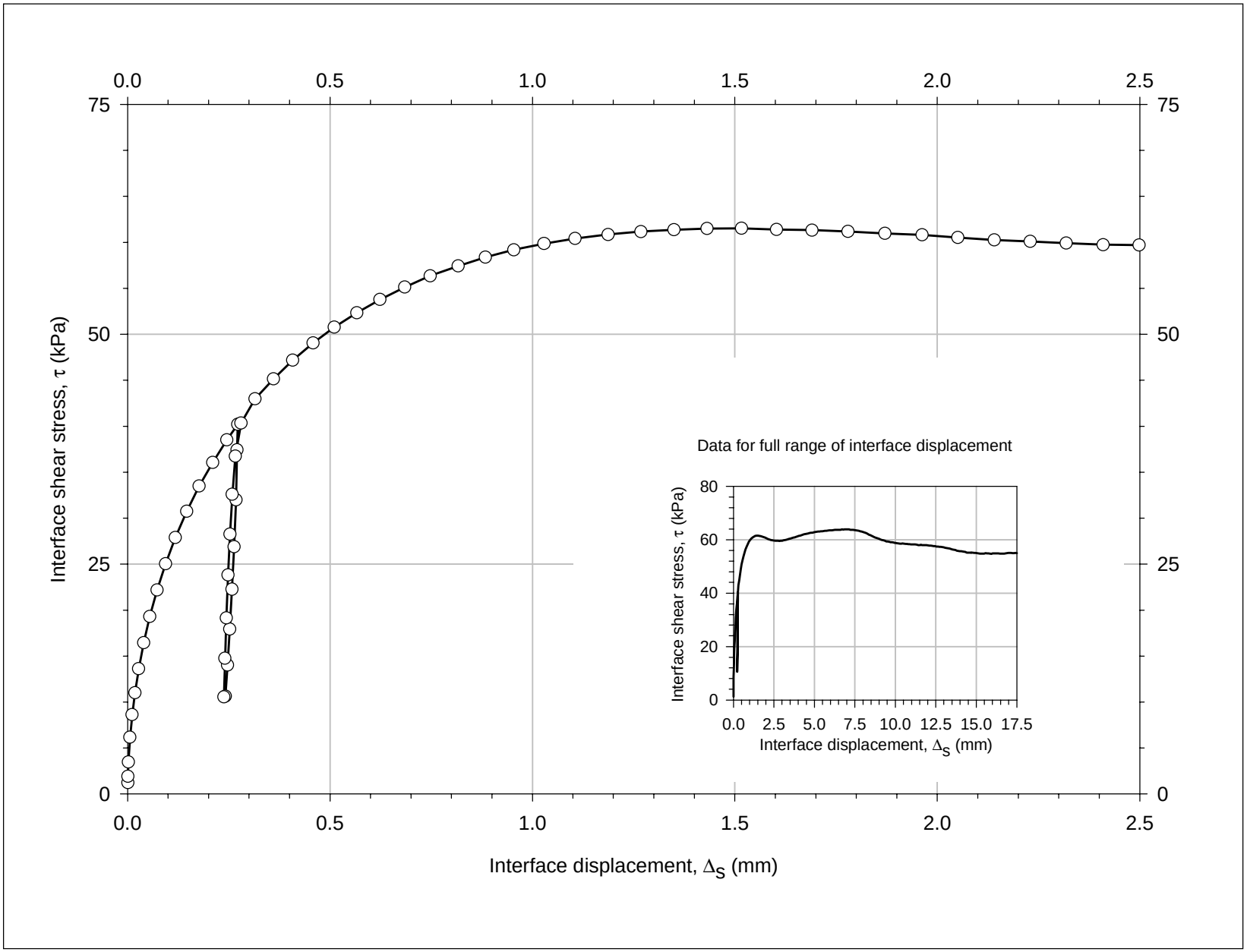
a. Detail of unload-reload cycle. Inset shows data for full range of interface displacement

Figure C13. Unload-reload test on dense Density sand-to-concrete interface, σ_n = 33 kPa, specimen S202 (Continued)



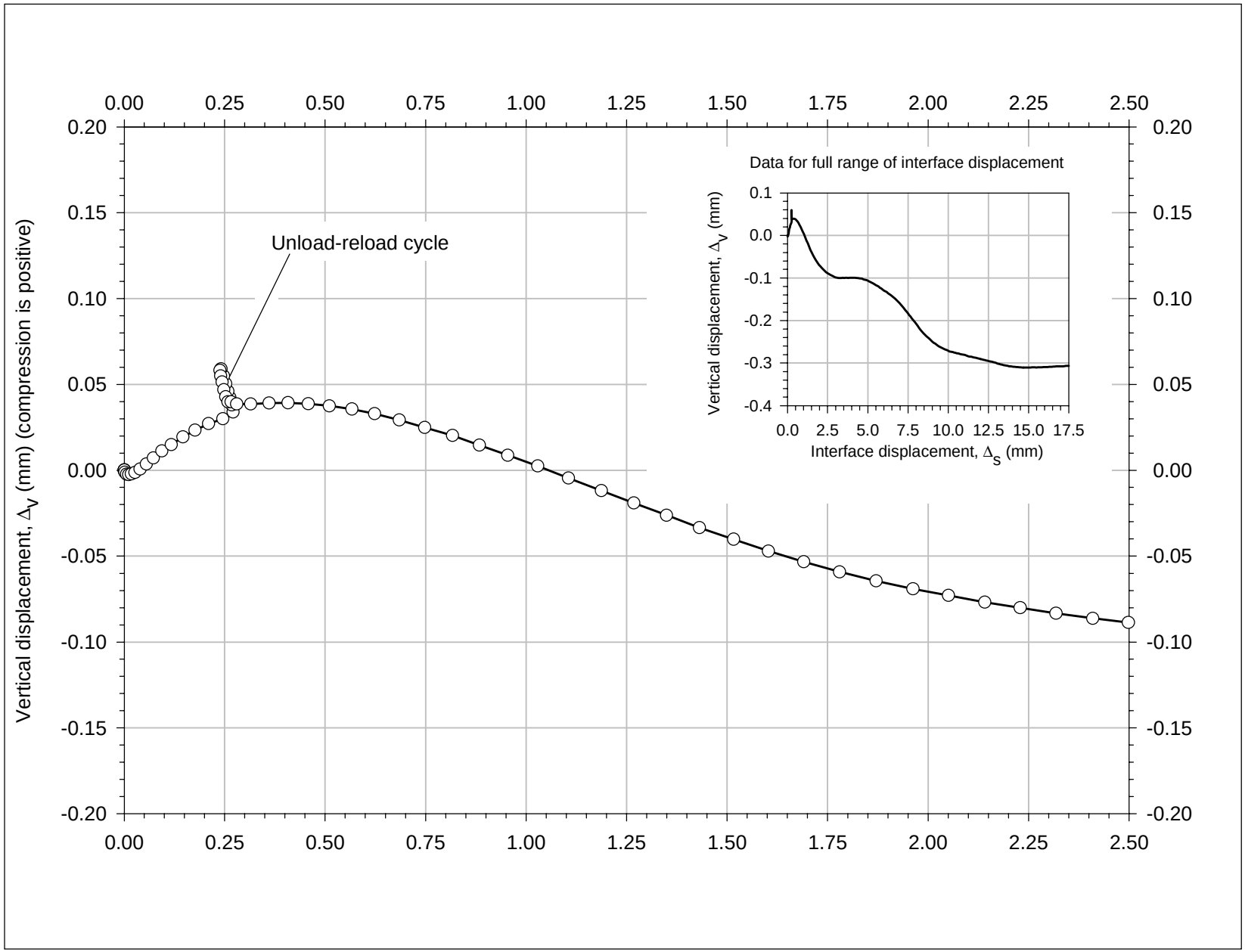
b. Vertical vs. horizontal interface displacement data

Figure C13. (Concluded)



a. Detail of unload-reload cycle. Inset shows data for full range of interface displacement

Figure C14. Unload-reload test on dense Density sand-to-concrete interface, σ_n = 102 kPa, specimen S203 (Continued)



b. Vertical vs. horizontal interface displacement data

Figure C14. (Concluded)

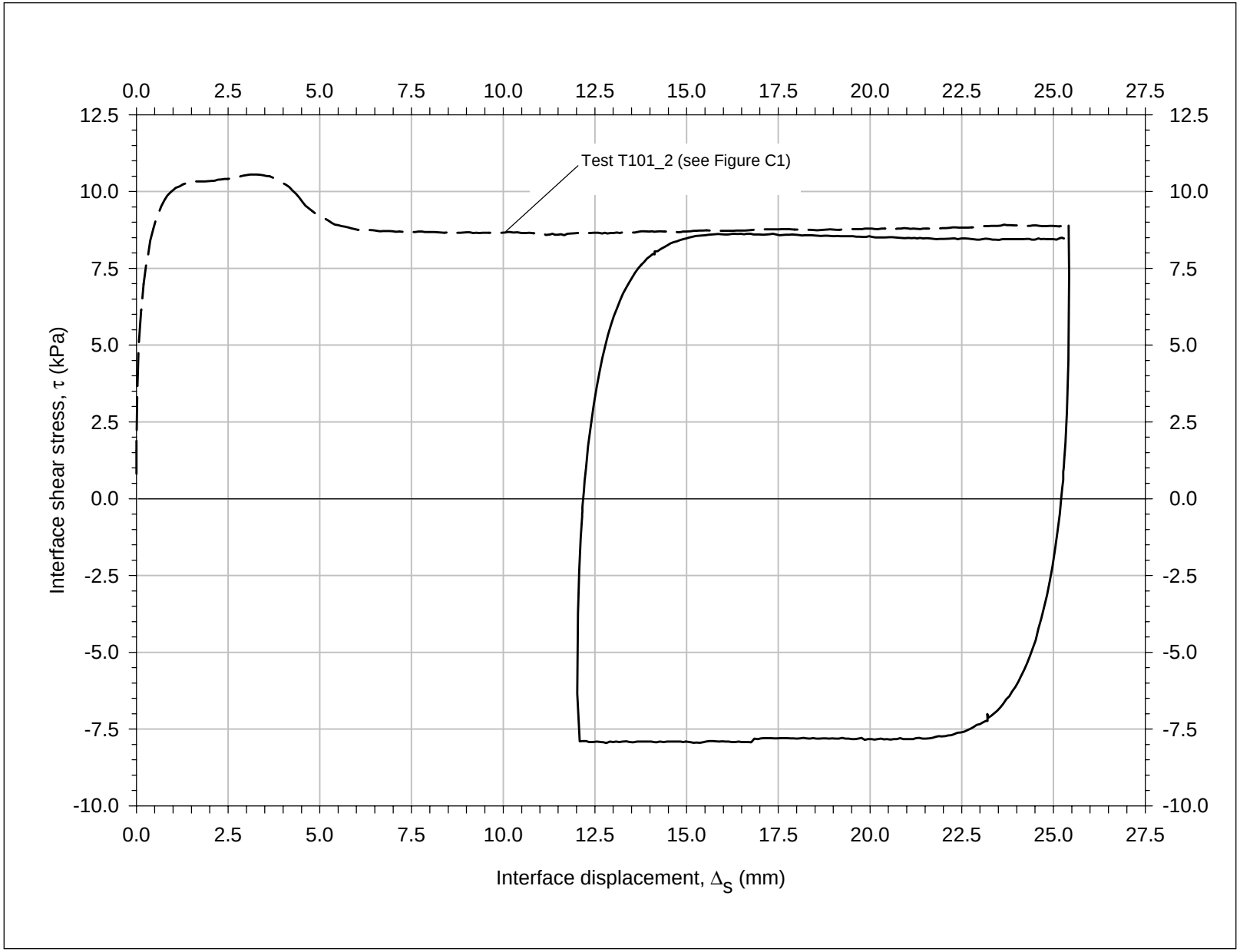


Figure C15. Cycle of shear reversals on dense Density Sand-to-concrete interface, σ_n = 15 kPa, specimen S101

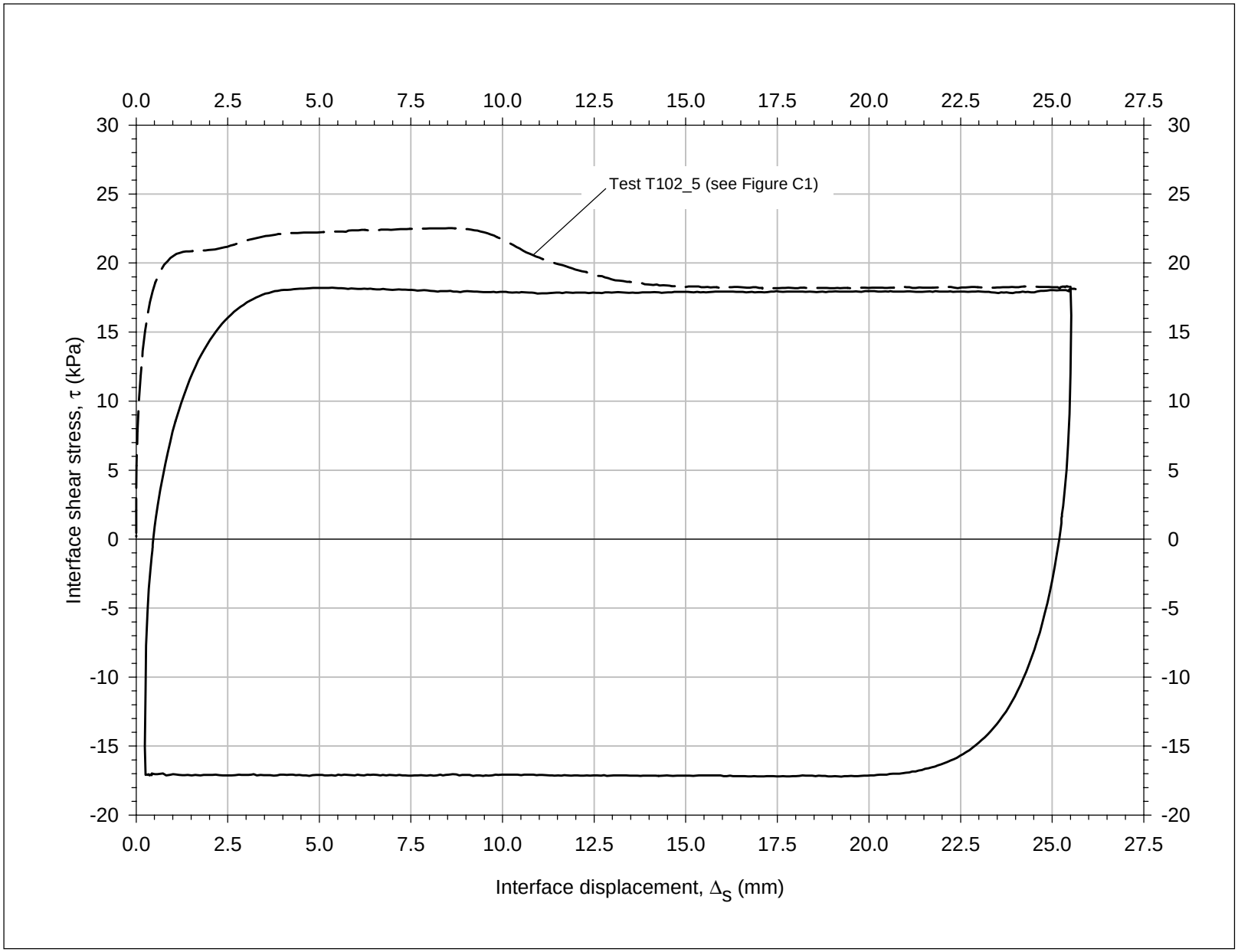


Figure C16. Cycle of shear reversals on dense Density Sand-to-concrete interface, σ_n = 33 kPa, specimen S102.

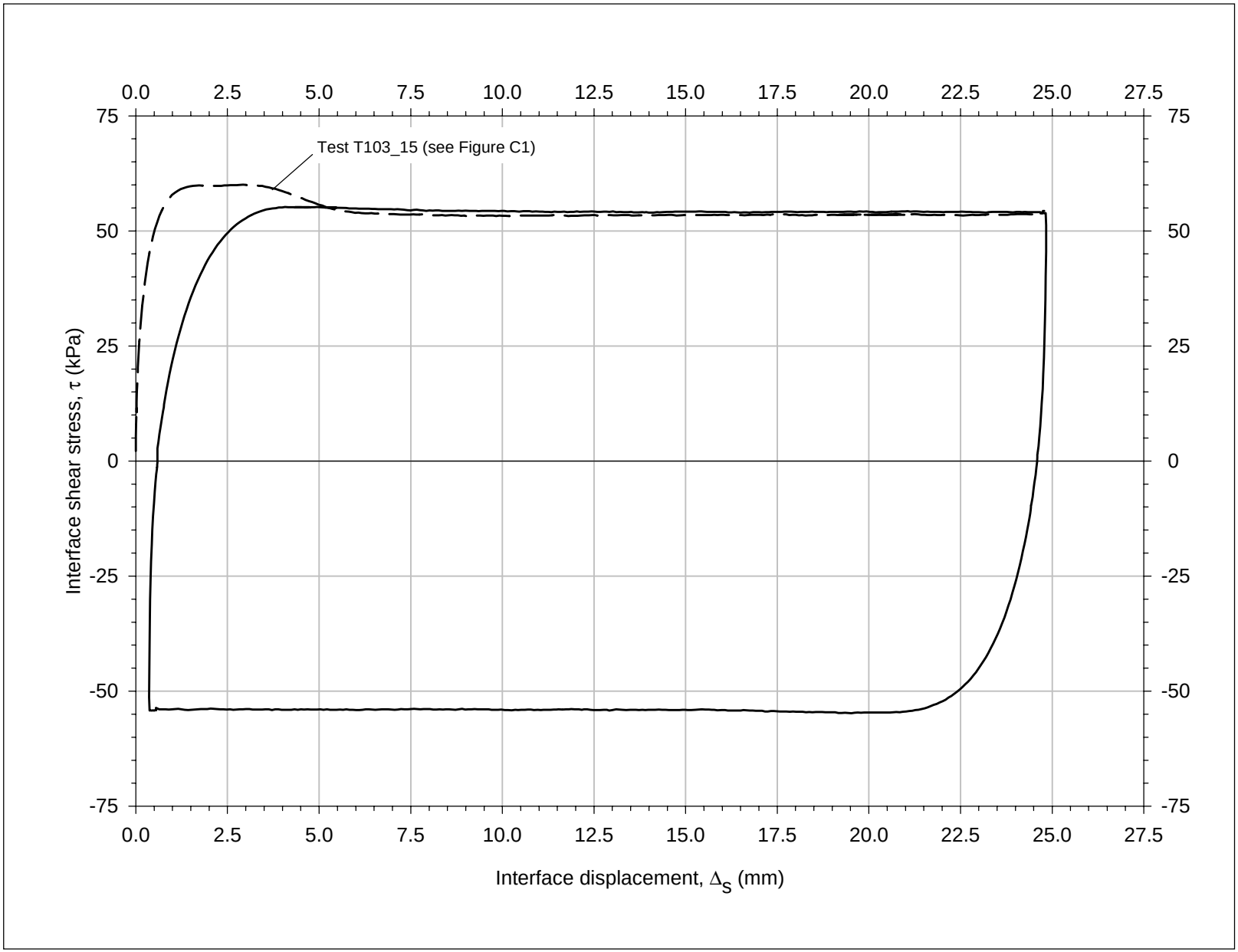


Figure C17. Cycle of shear reversals on dense Density Sand-to-concrete interface, σ_n = 102 kPa, specimen S103

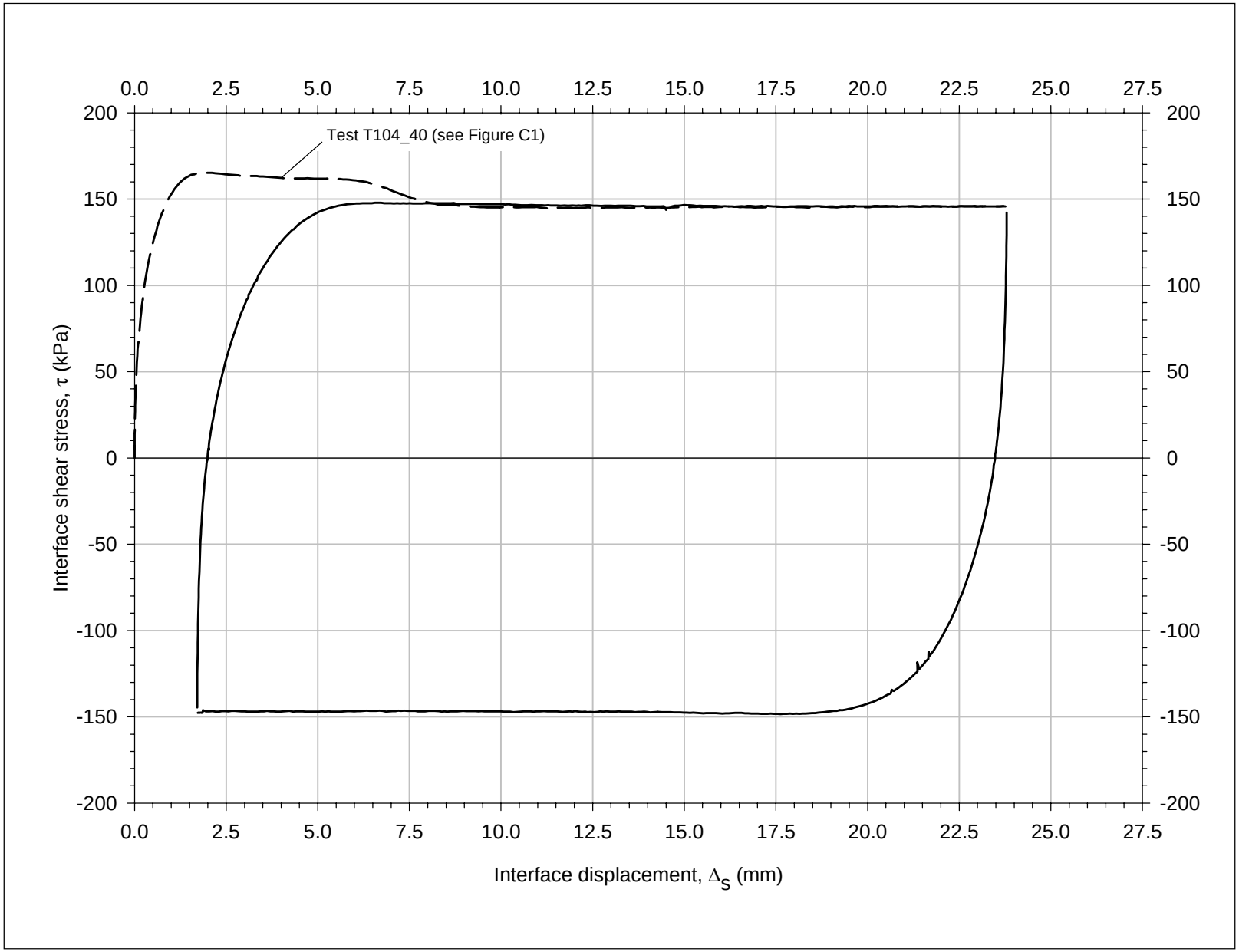


Figure C18. Cycle of shear reversals on dense Density Sand-to-concrete interface, σ_n = 274 kPa, specimen S104

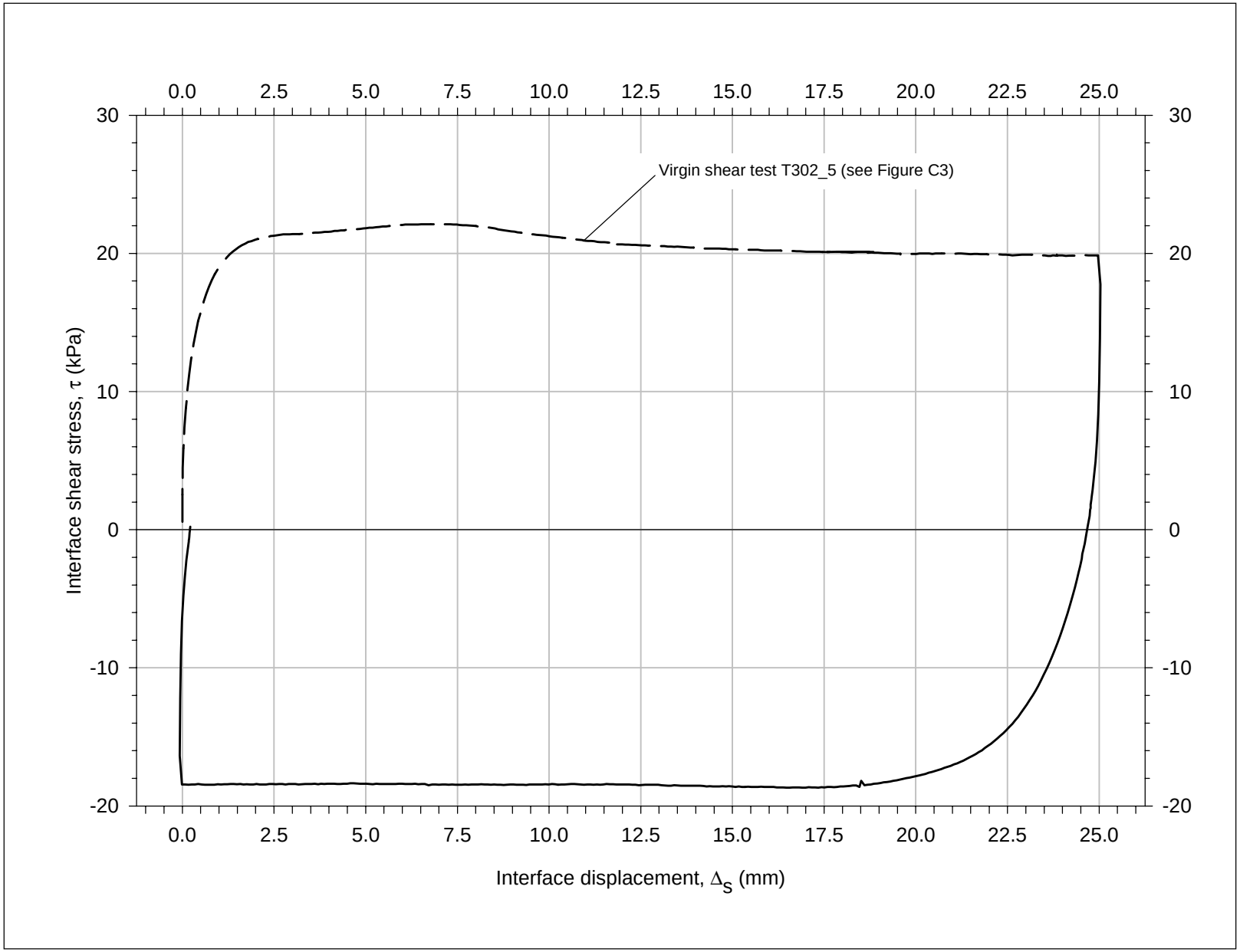


Figure C19. Shear reversal on medium dense Density Sand-to-concrete interface, σ_n = 35 kPa, specimen S302

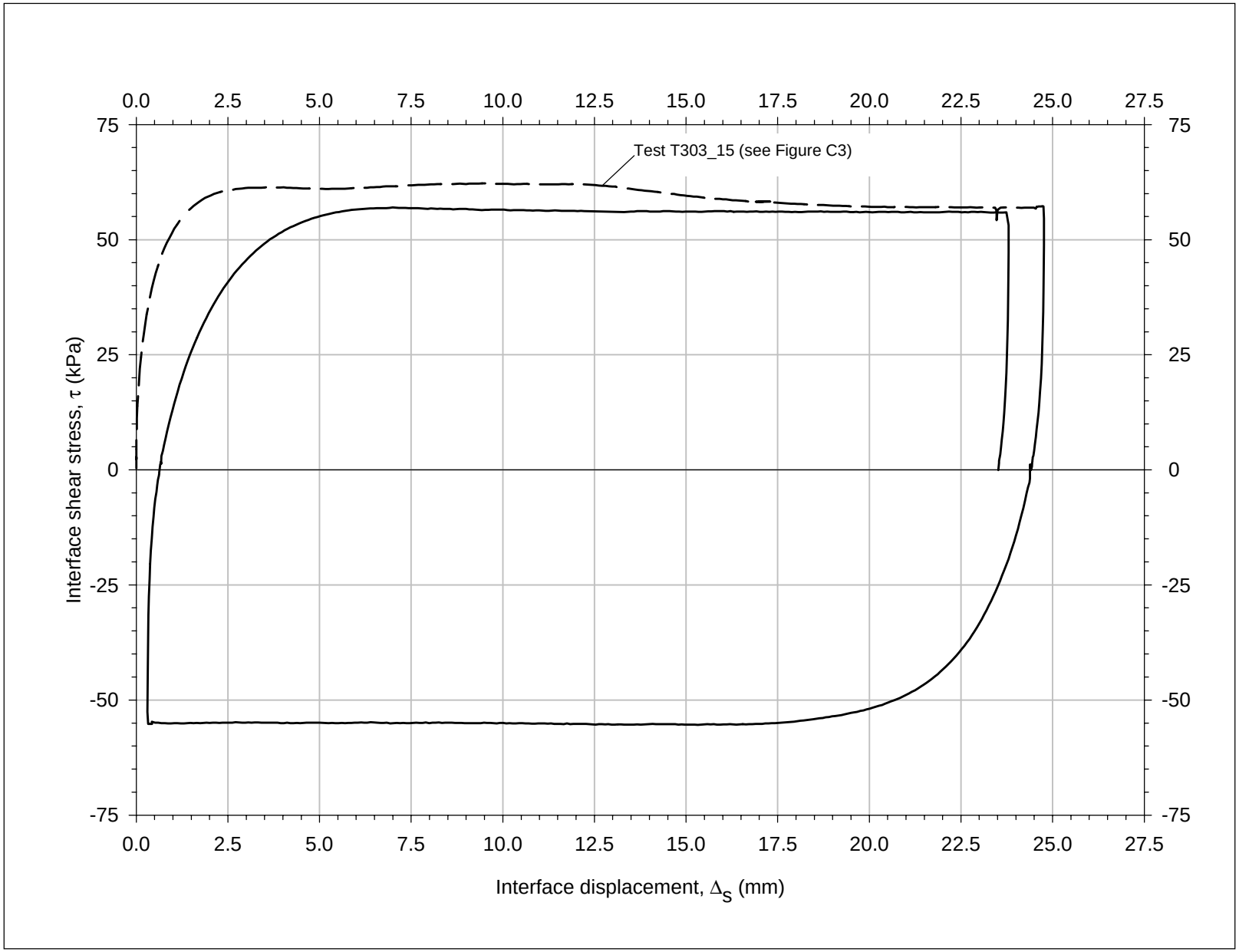


Figure C20. Cycle of shear reversals on medium dense Density Sand-to-concrete interface, σ_n = 104 kPa, specimen S303

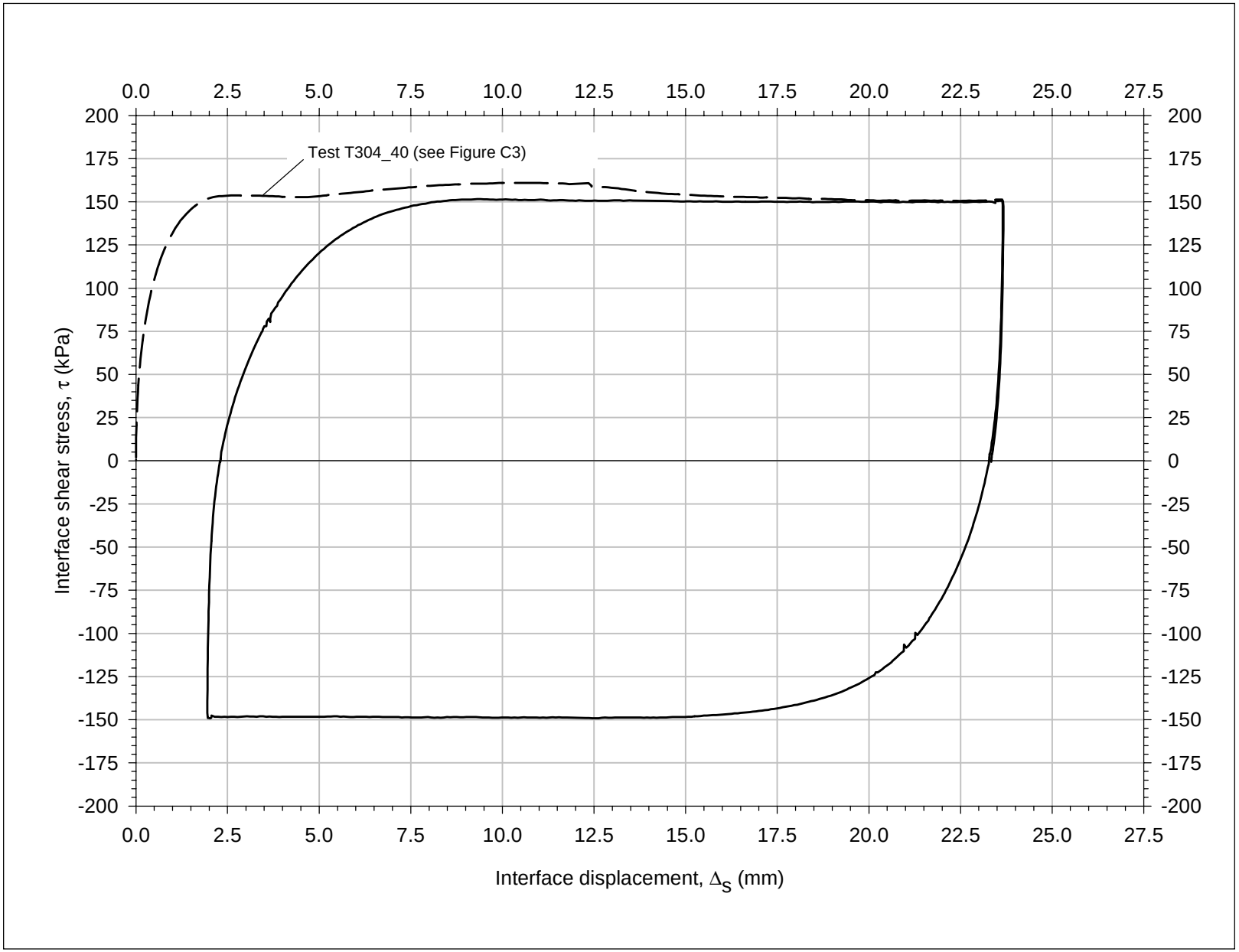


Figure C21. Cycle of shear reversals on medium dense Density Sand-to-concrete interface, σ_n = 276 kPa, specimen S304

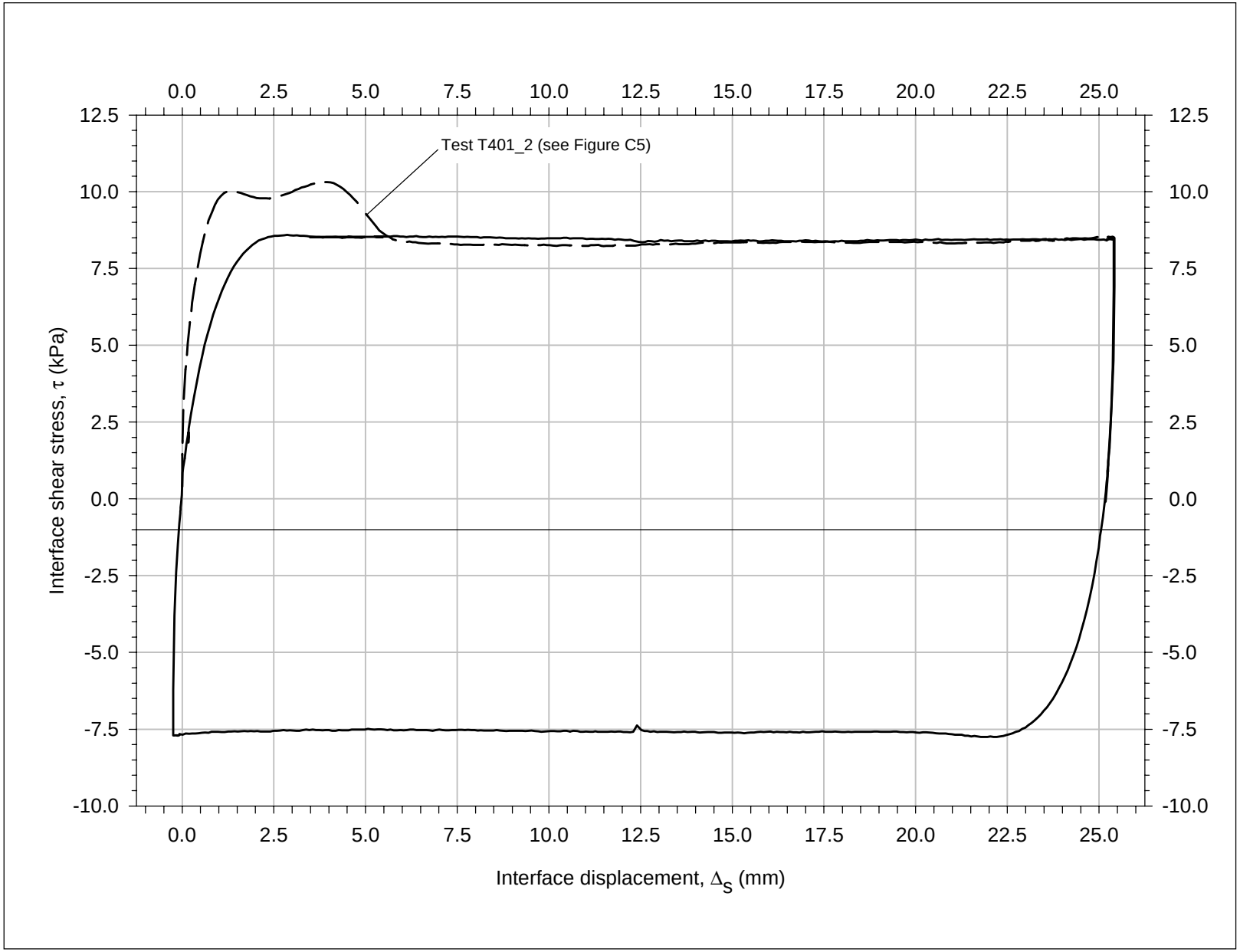


Figure C22. Shear reversal on dense Light Castle Sand-to-concrete interface, σ_n = 15 kPa, specimen S401

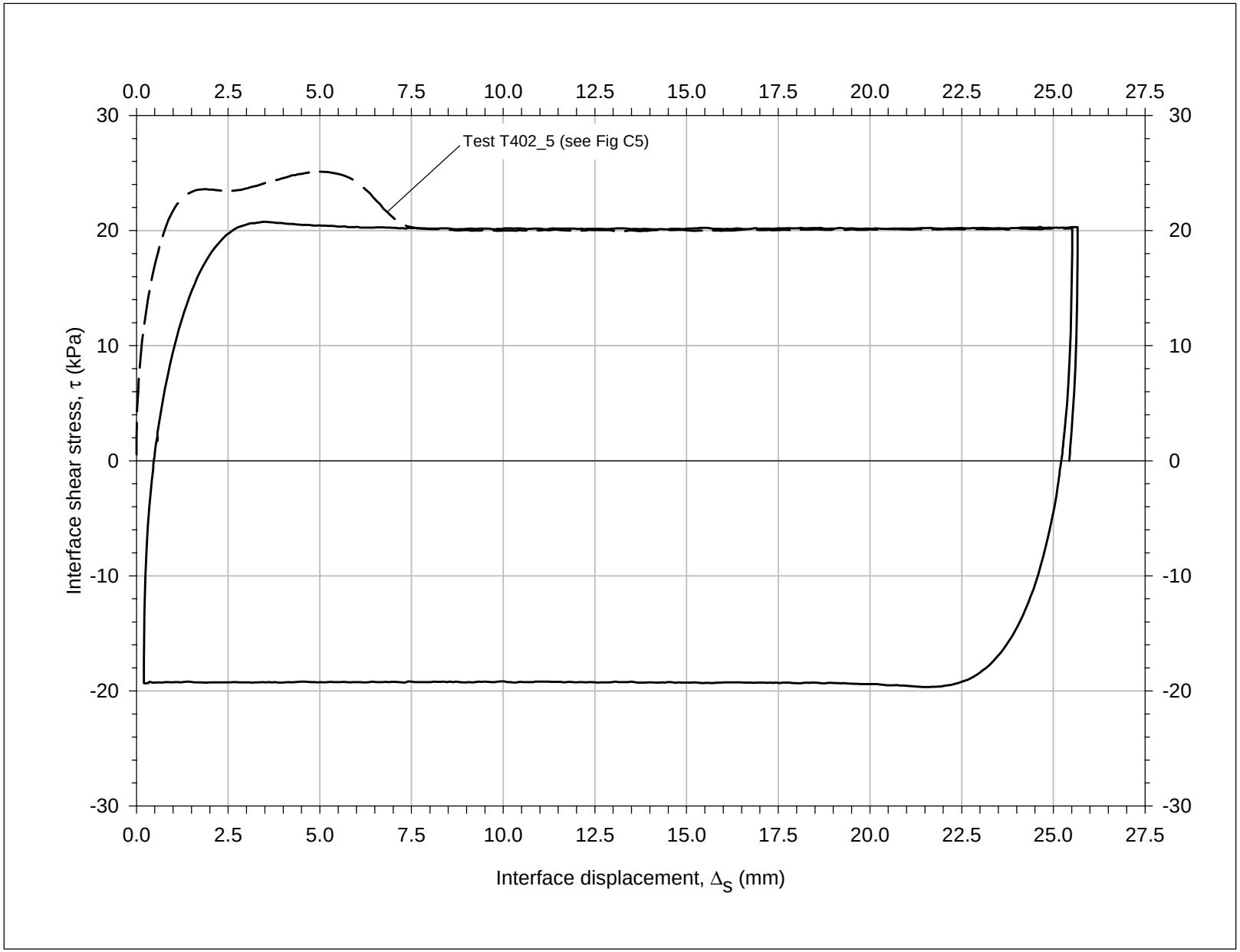


Figure C23. Shear reversal on dense Light Castle Sand-to-concrete interface, σ_n = 35 kPa, specimen S402

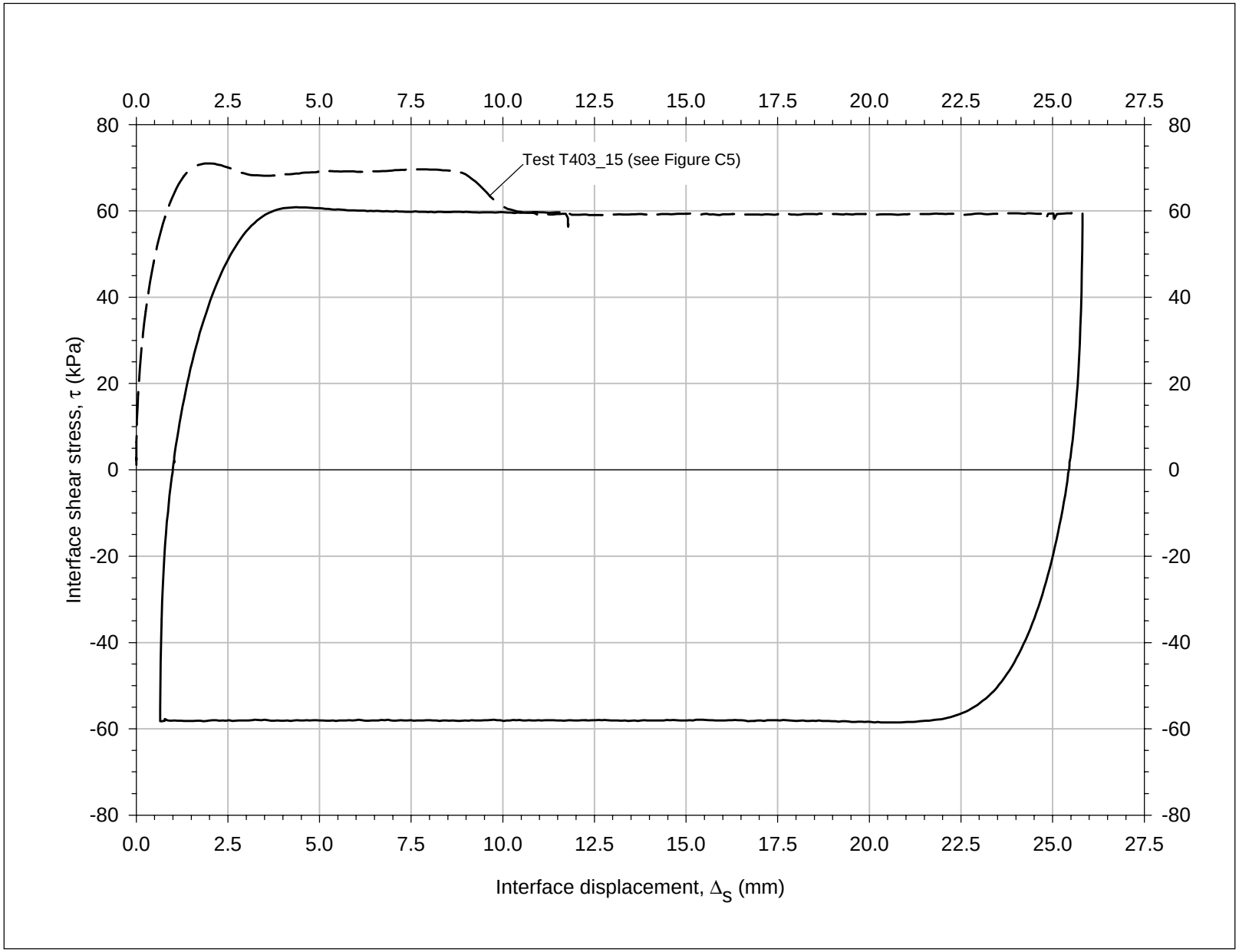


Figure C24. Cycle of shear reversals on dense Light Castle Sand-to-concrete interface, σ_n = 104 kPa, specimen S403

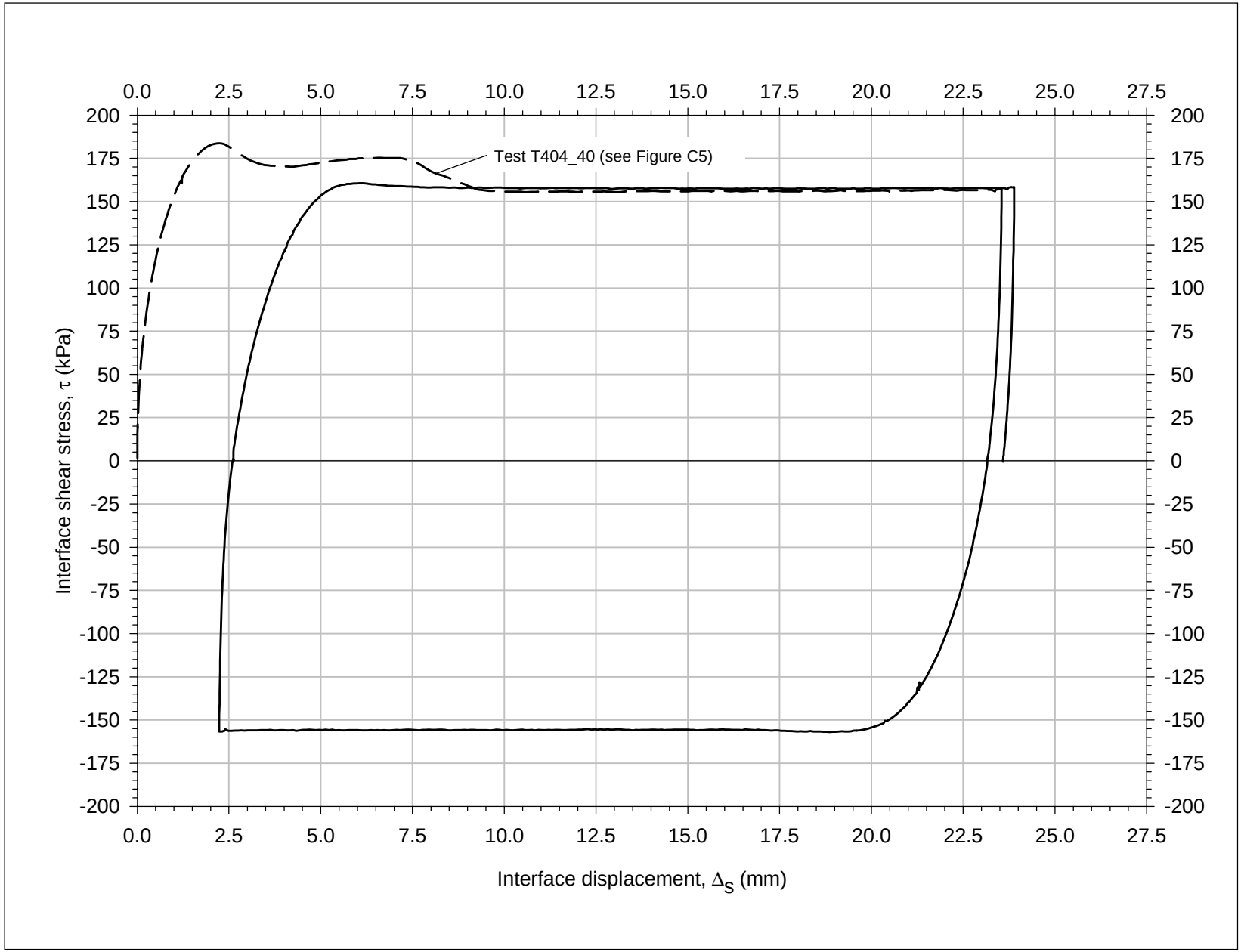
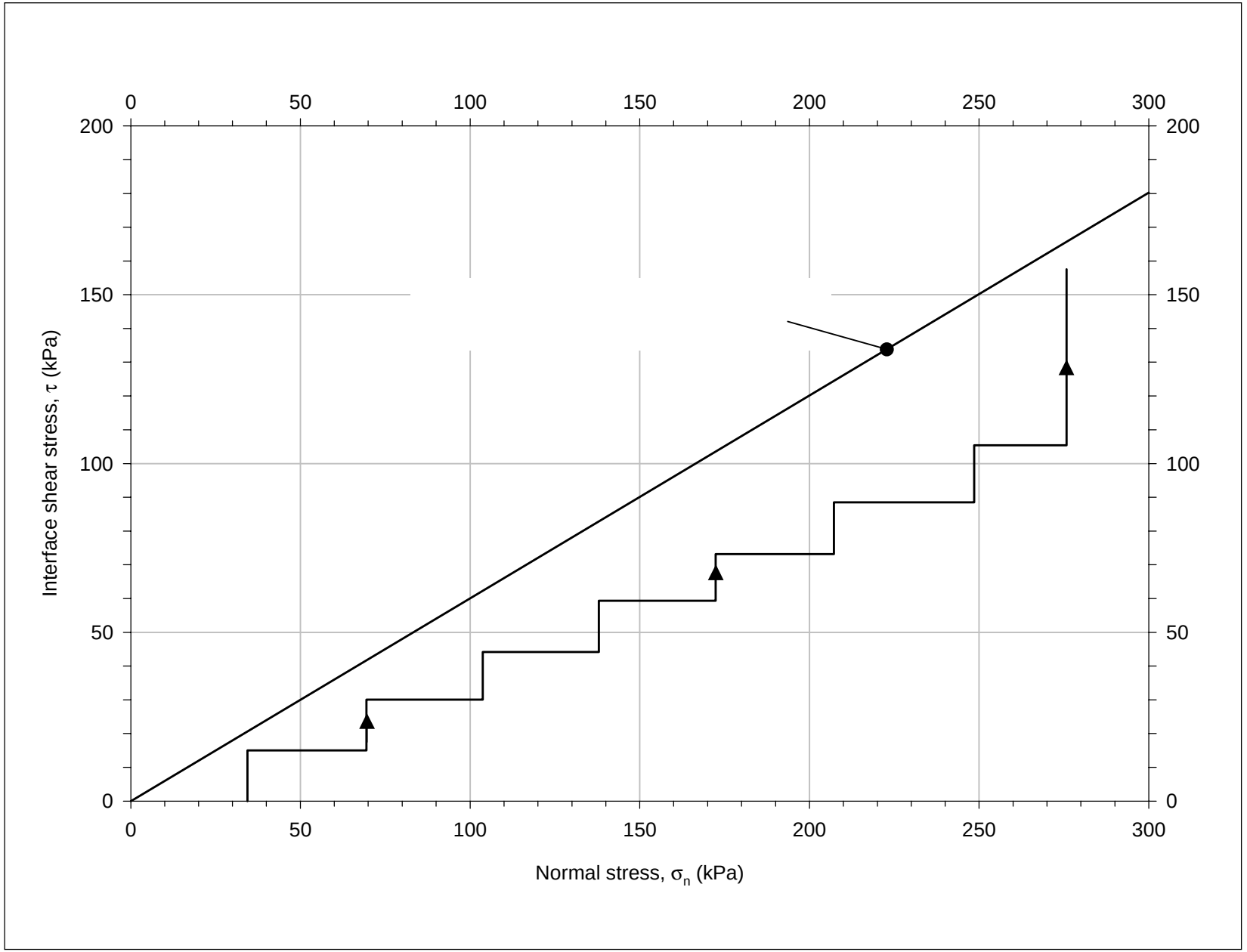
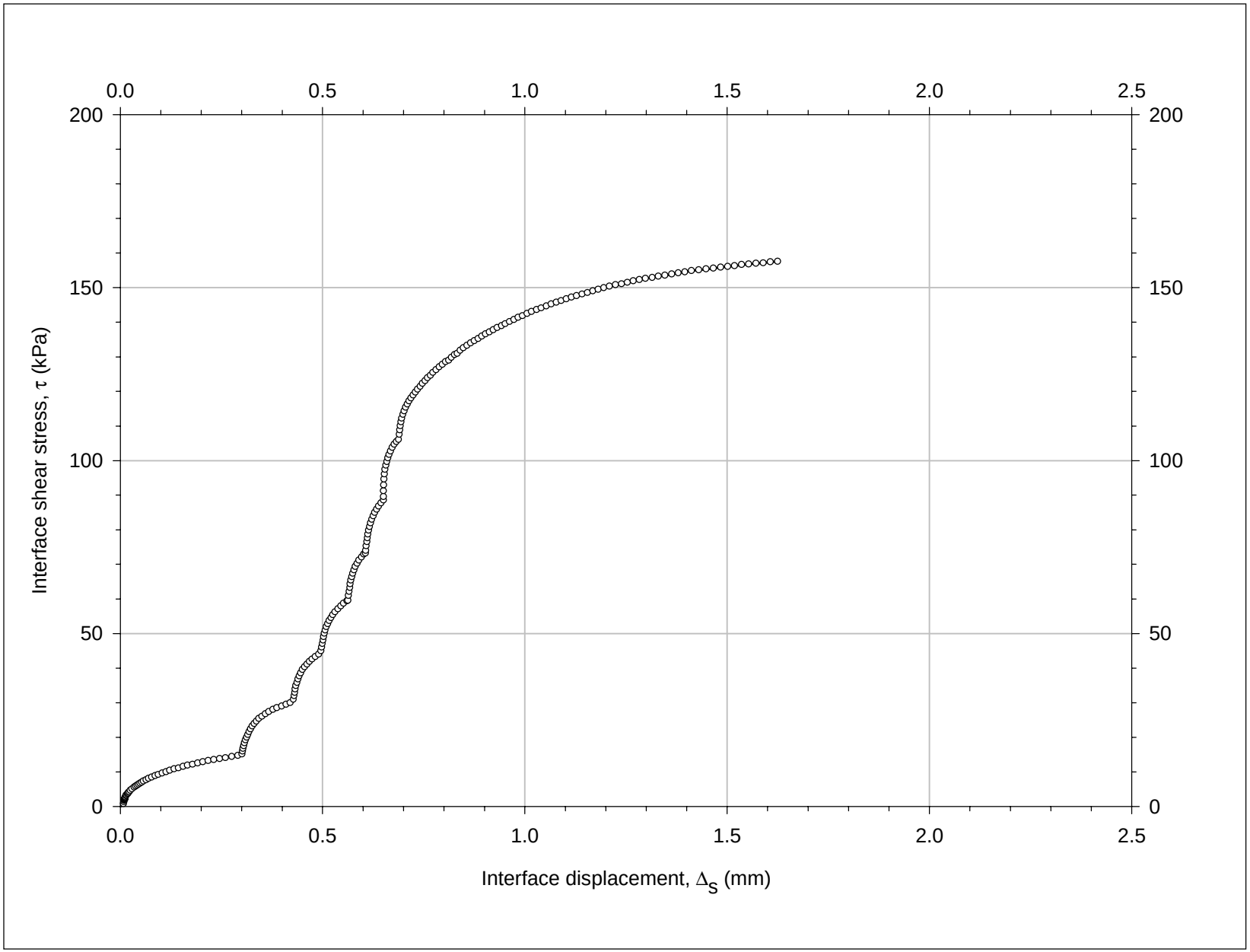


Figure C25. Cycle of shear reversals on dense Light Castle Sand-to-concrete interface, σ_n = 276 kPa, specimen S404



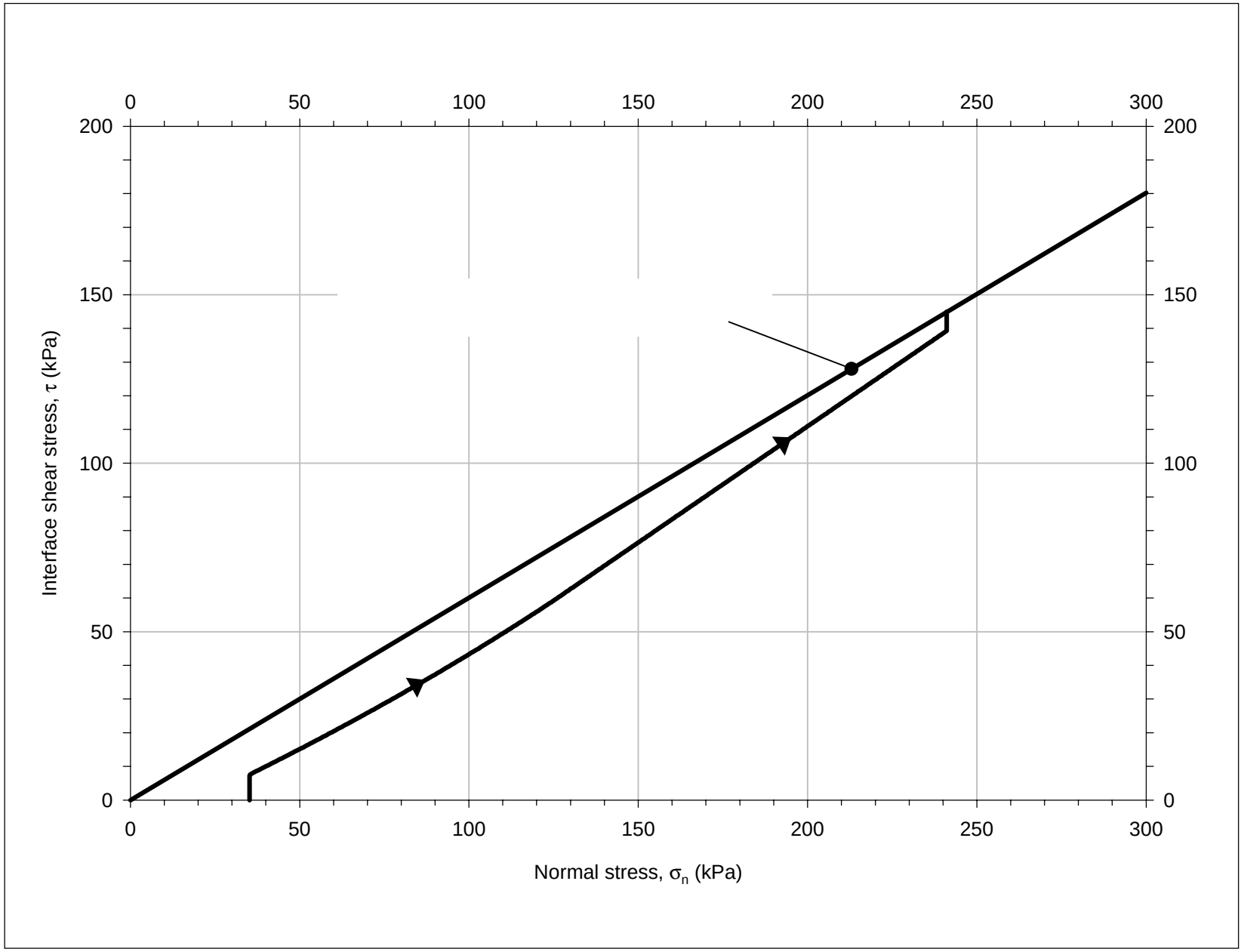
a. Stress path applied during test

Figure C26. Multi-directional stress path test T204_5 on dense Density Sand-to-concrete interface (Continued)



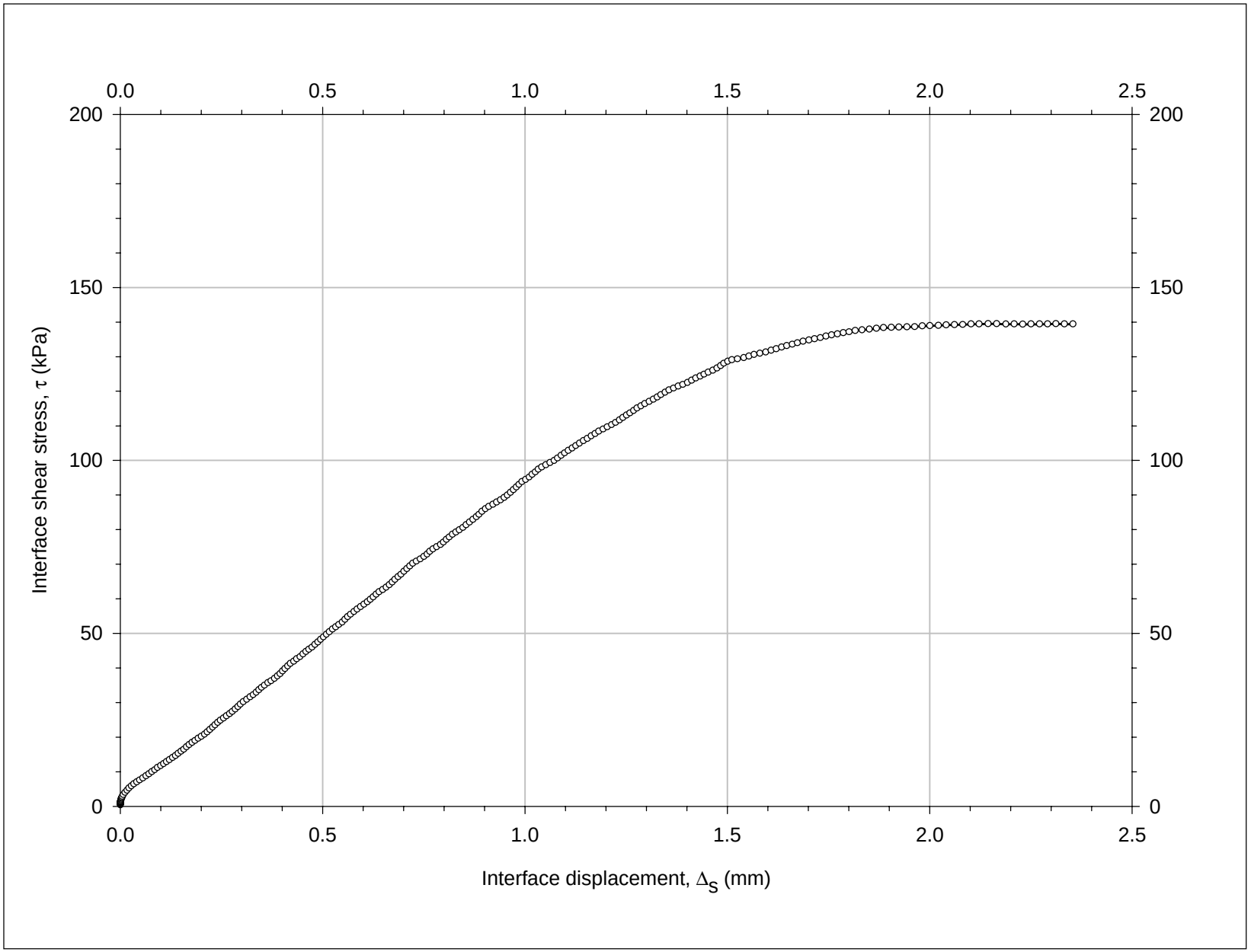
b. Shear stress vs. interface displacement data

Figure C26. (Concluded)



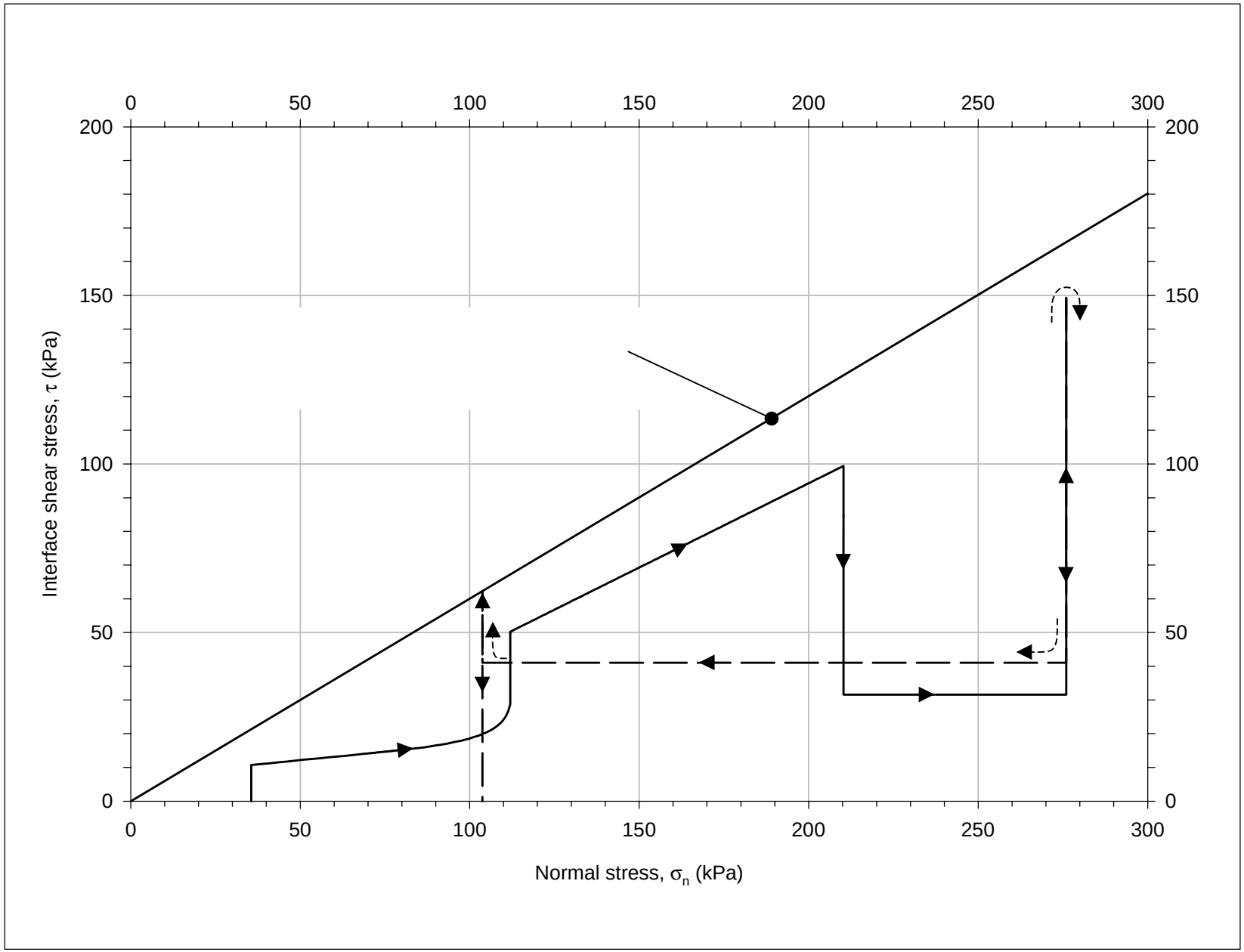
a. Stress path applied during test

Figure C27. Multi-directional stress path test T205_5 on dense Density Sand-to-concrete interface (Continued)



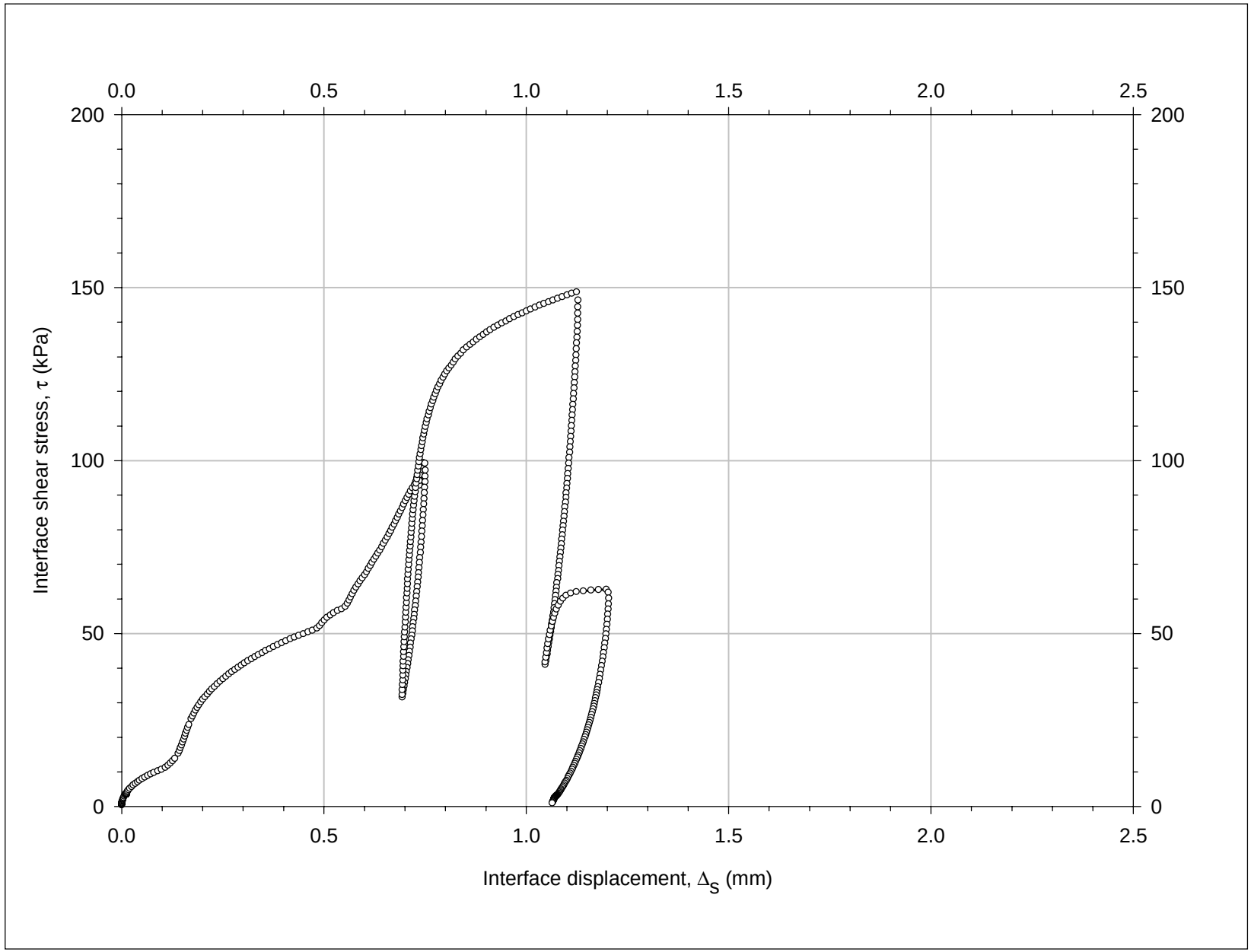
b. Shear stress vs. interface displacement data

Figure C27. (Concluded)

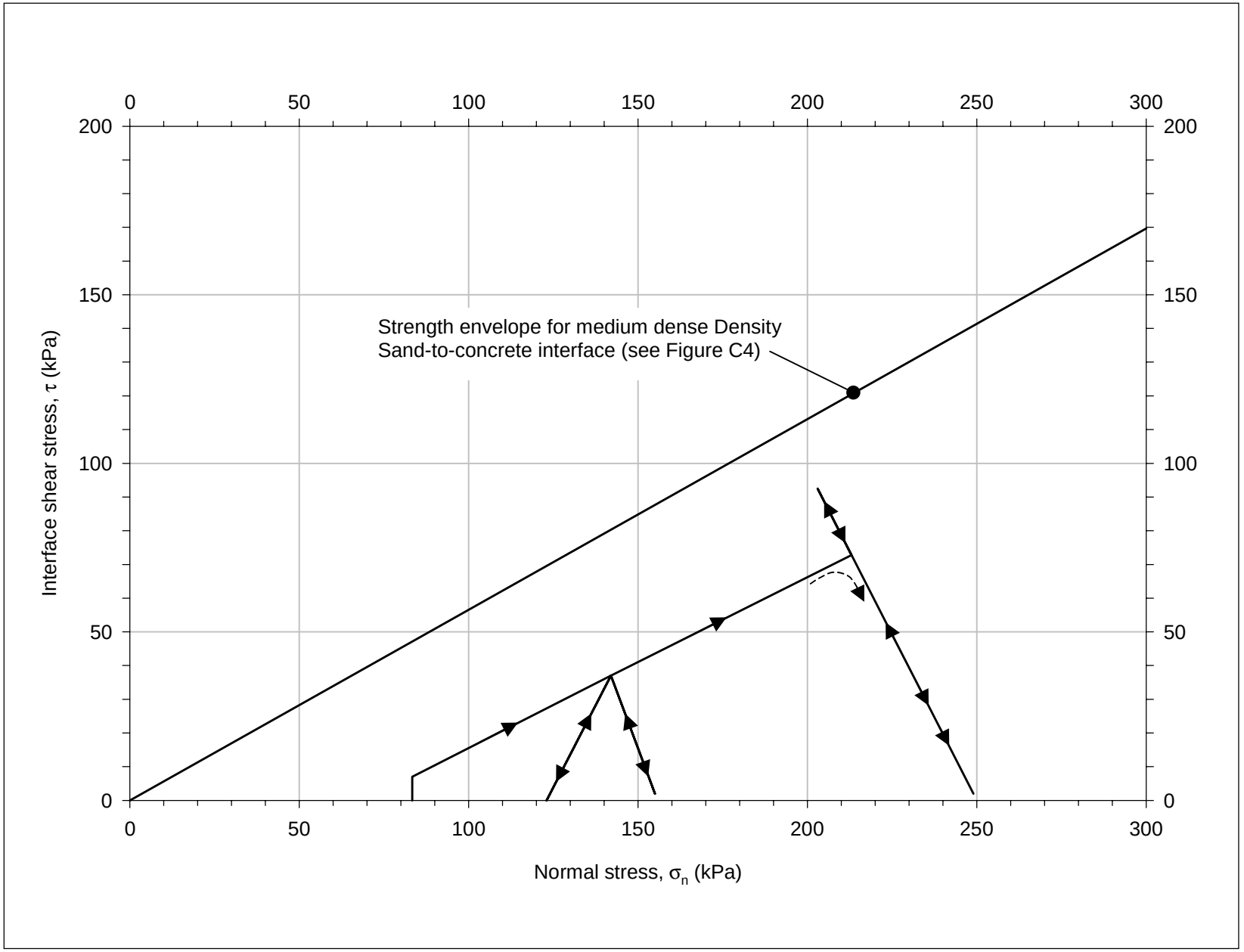


a. Stress path applied during test

Figure C28. Multi-directional stress path test T206_5 on dense Density Sand-to-concrete interface (Continued)

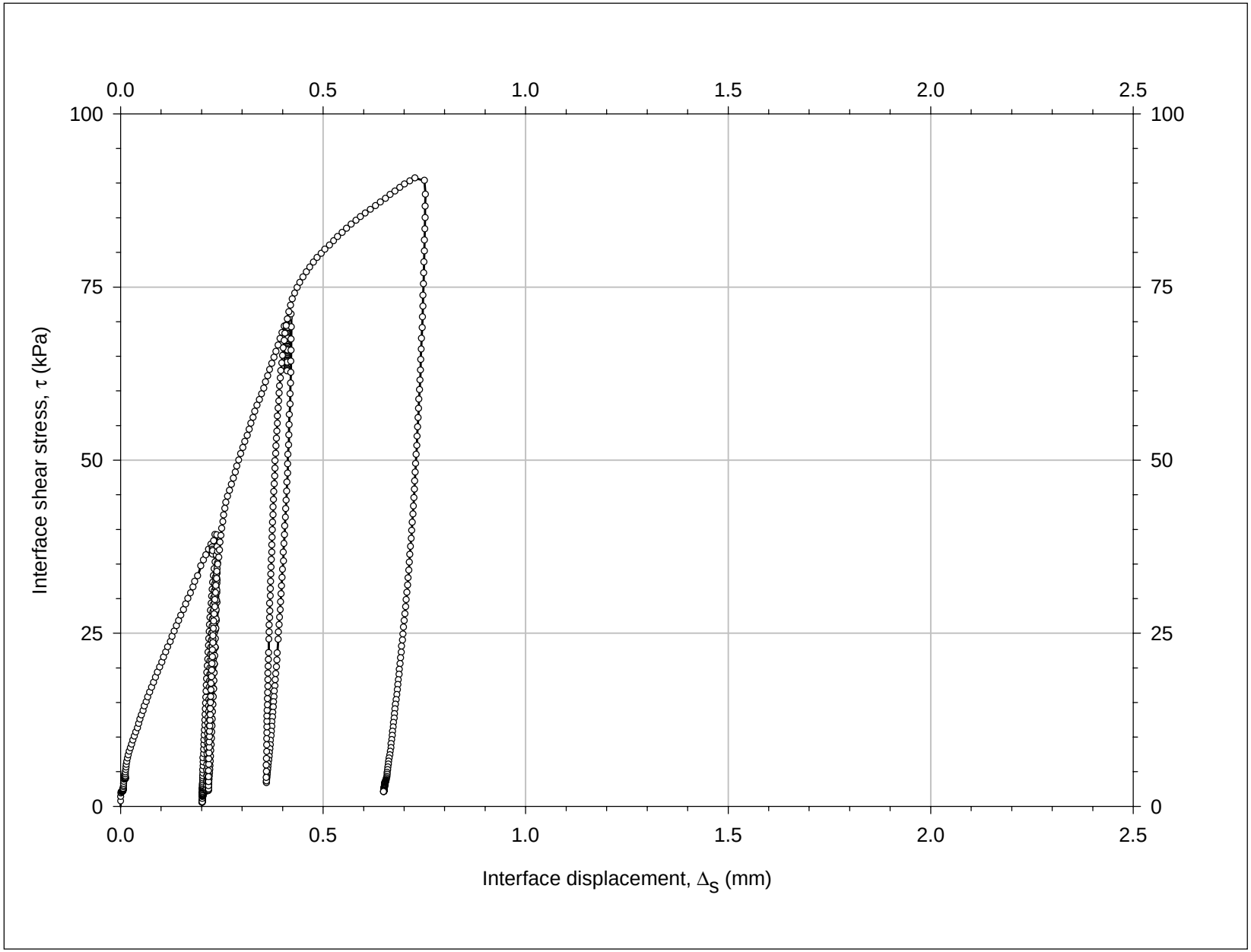


b. Shear stress vs. interface displacement data
Figure C28. (Concluded)



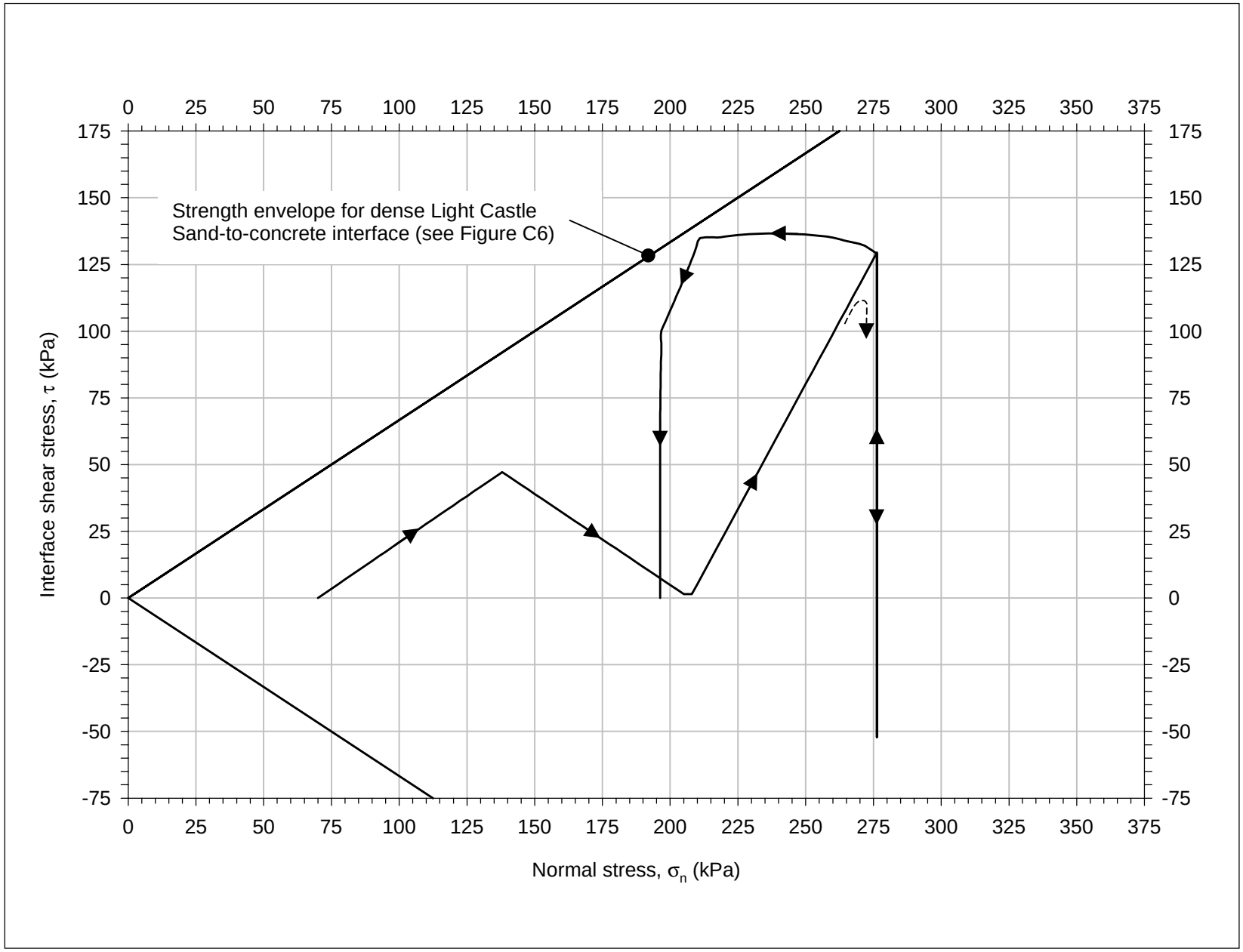
a. Stress path applied during test

Figure C29. Multi-directional stress path test T305_10 on medium dense Density Sand-to-concrete interface (Continued)



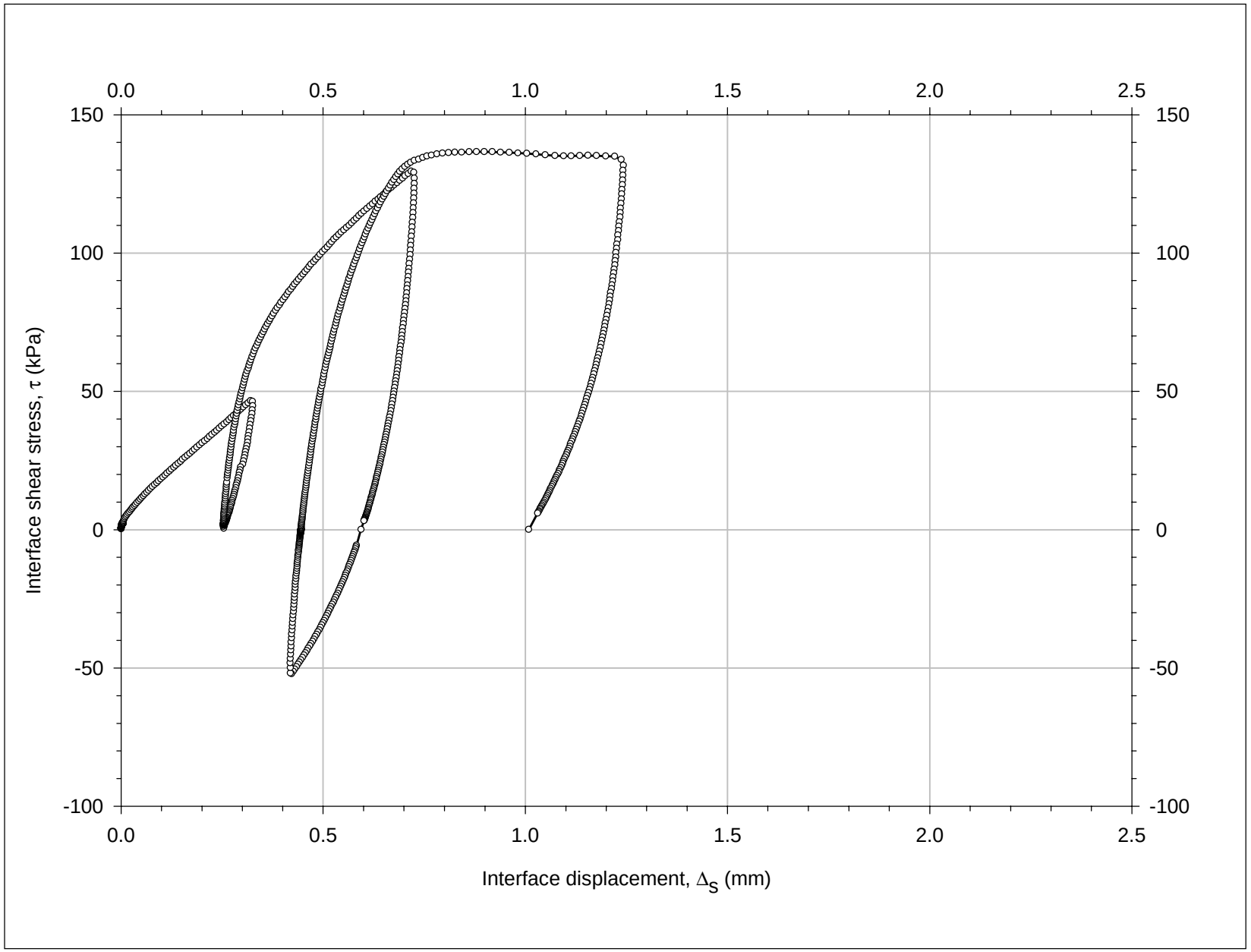
b. Shear stress vs. interface displacement data

Figure C29. (Concluded)



a. Stress path applied during test

Figure C30. Multi-directional stress path test T405_10 on dense Light Castle Sand-to-concrete interface (Continued)



b. Shear stress vs. interface displacement data

Figure C30. (Concluded)