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Appendix: Details of the Test Results

A.1 Mild steel Grade A

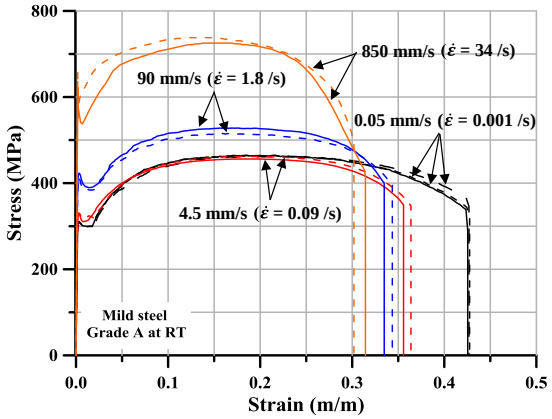

Figure A.1. Engineering stress-engineering strain curves for mild steel Grade A at room temperature.

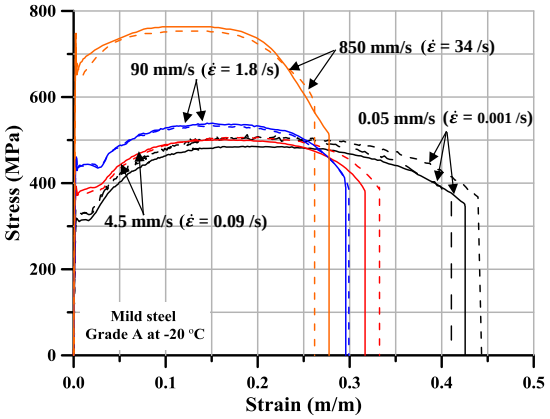

Figure A.2. Engineering stress- engineering strain curves for mild steel Grade A at -20 deg. C.

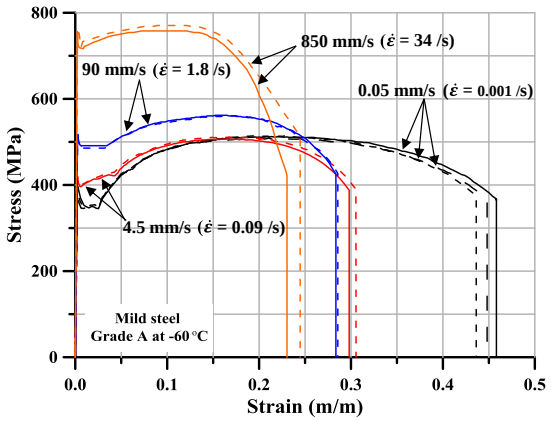

Figure A.3. Engineering stress- engineering strain curves for mild steel Grade A at -60 deg. C.

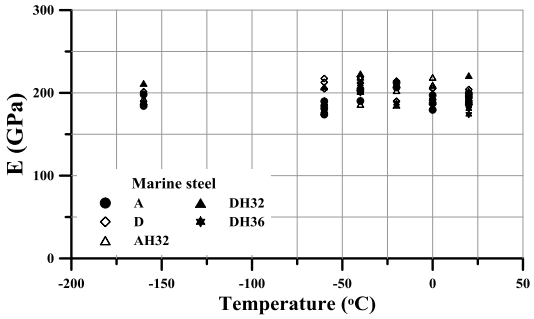

Figure A.4. Effects of low temperature on elastic modulus of steels.

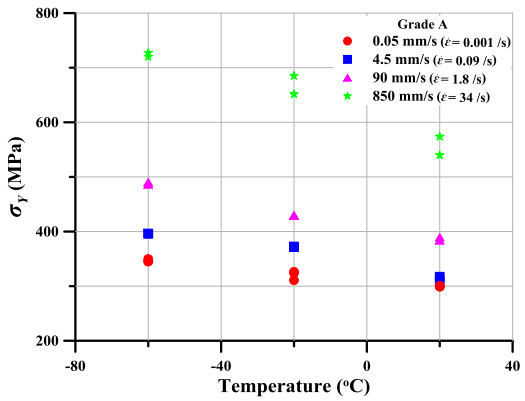

Figure A.5. Effects of low temperature on yield strength of mild steel Grade A.

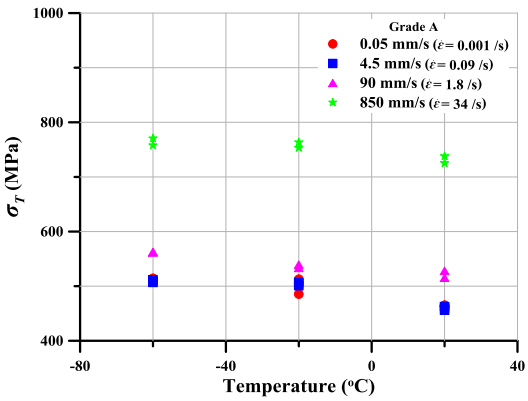

Figure A.6. Effects of low temperature on tensile strength of mild steel Grade A.

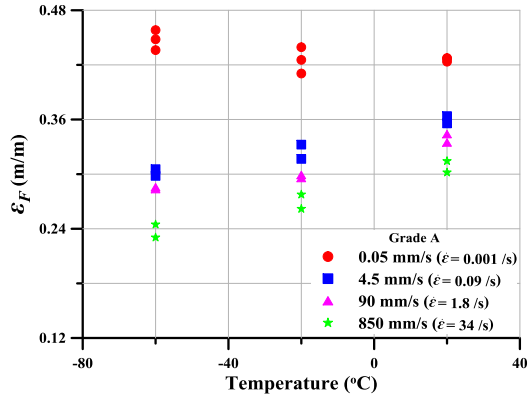

Figure A.7. Effects of low temperature on fracture (total breaking) of mild steel Grade A.

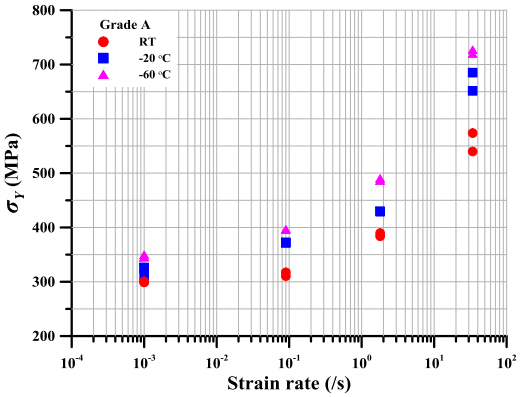

Figure A.8. Effects of strain rate on yield strength of mild steel Grade A.

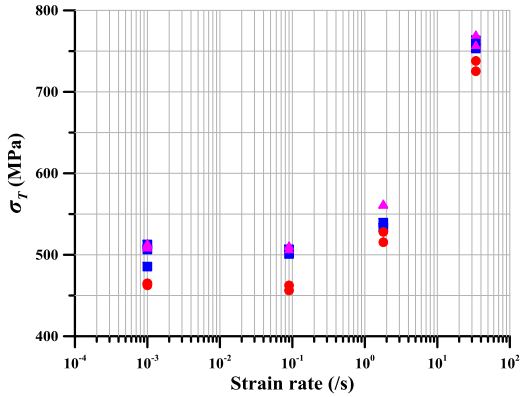

Figure A.9. Effects of strain rate on tensile strength of mild steel Grade A.

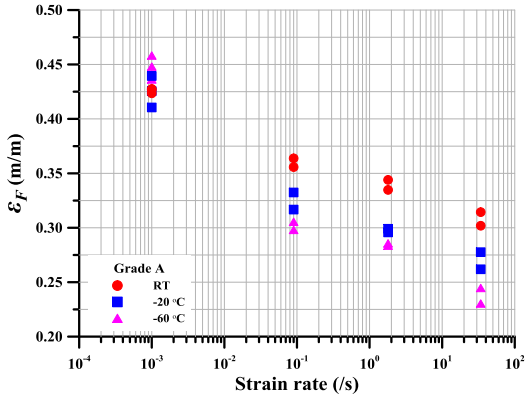

Figure A.10. Effects of strain rate on fracture (total breaking) strain of mild steel Grade A.

A.2 Mild steel Grade D

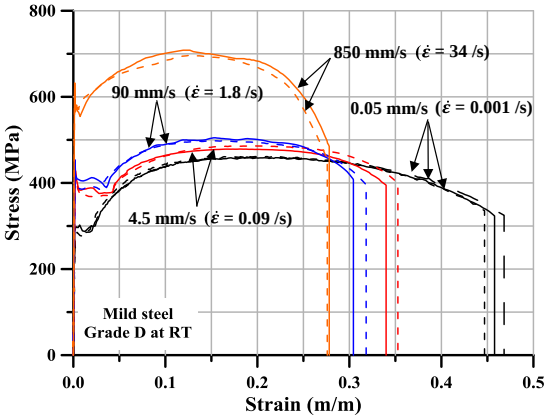

Figure A.11. Engineering stress- engineering strain curves for mild steel Grade D at room temperature.

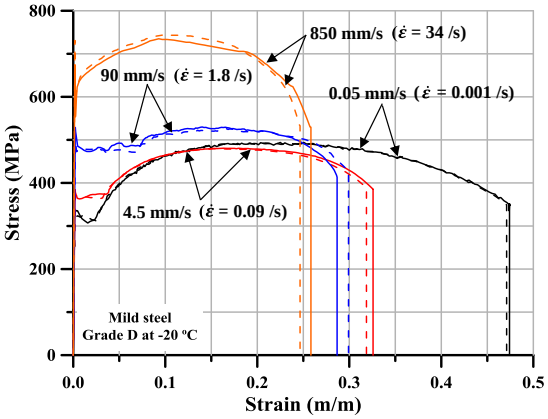

Figure A.12. Engineering stress- engineering strain curves for mild steel Grade D at -20 deg. C.

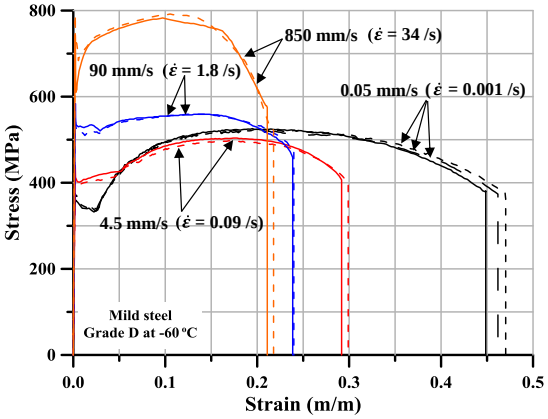

Figure A.13. Engineering stress- engineering strain curves for mild steel Grade D at -60 deg. C.

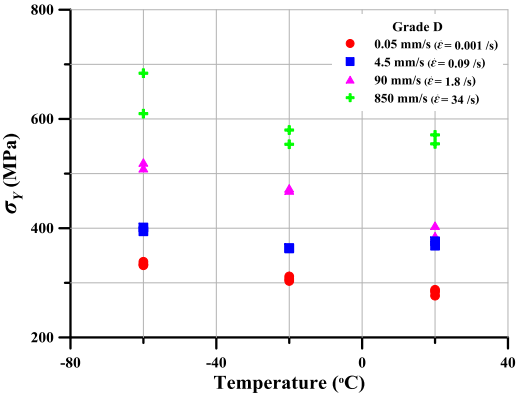

Figure A.14. Effects of low temperature on yield strength of mild steel Grade D.

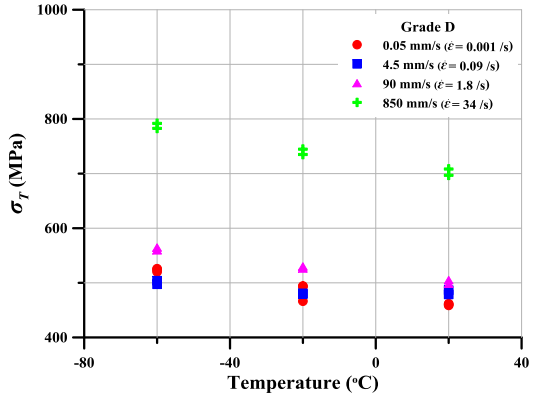

Figure A.15. Effects of low temperature on tensile strength of mild steel Grade D.

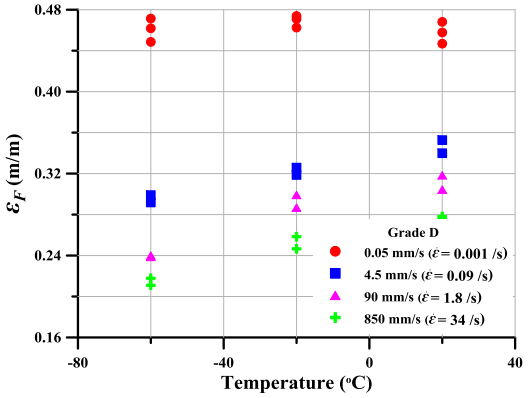

Figure A.16. Effects of low temperature on fracture (total breaking) strain of mild steel Grade D.

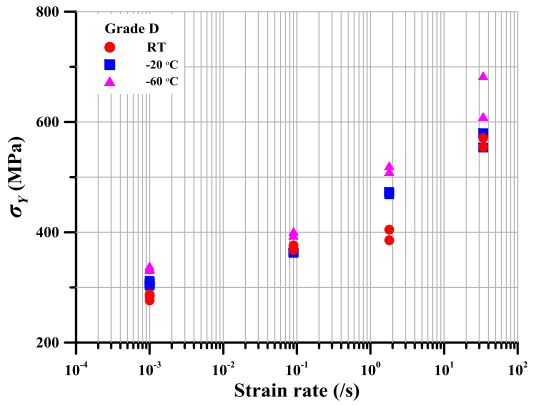

Figure A.17. Effects of strain rate on yield strength of mild steel Grade D.

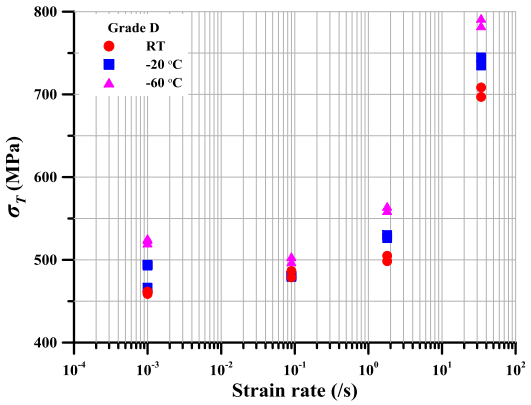

Figure A.18. Effects of strain rate on tensile strength of mild steel Grade D.

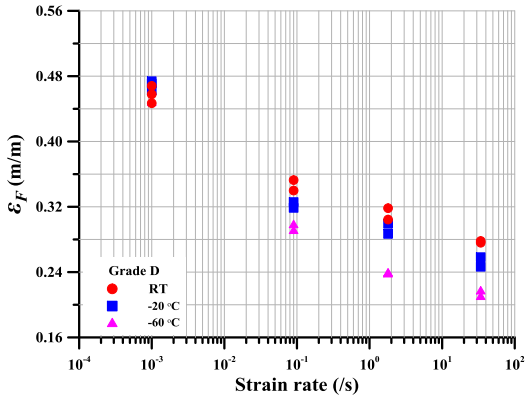

Figure A.19. Effects of strain rate on fracture (total breaking) strain of mild steel Grade D.

A.3 High-tensile steel AH 32

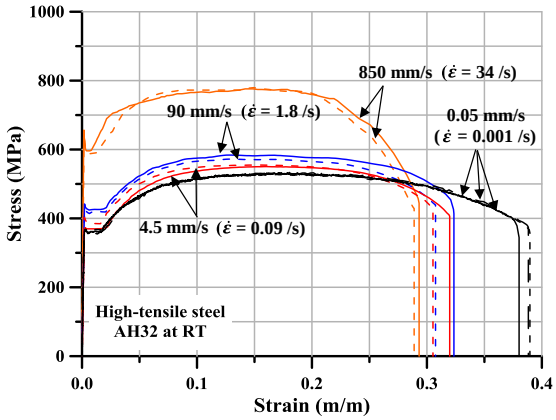

Figure A.20. Engineering stress- engineering strain curves for high-tensile steel AH32 at room temperature.

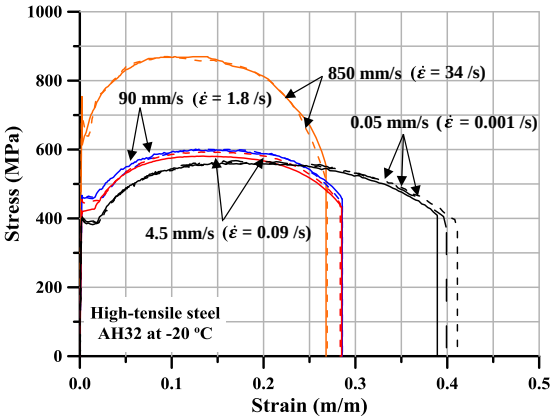

Figure A.21. Engineering stress- engineering strain curves for high-tensile steel AH 32 at -20 deg. C.

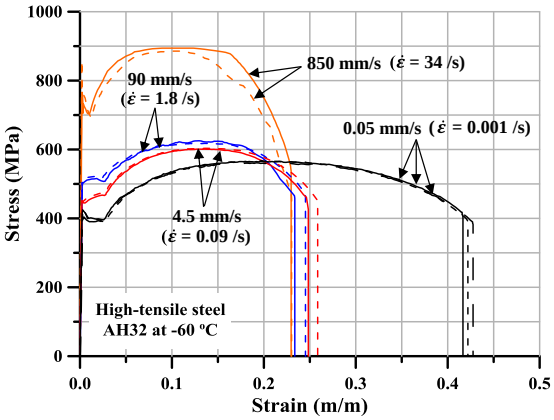

Figure A.22. Engineering stress- engineering strain curves for high-tensile steel AH 32 at -60 deg. C.

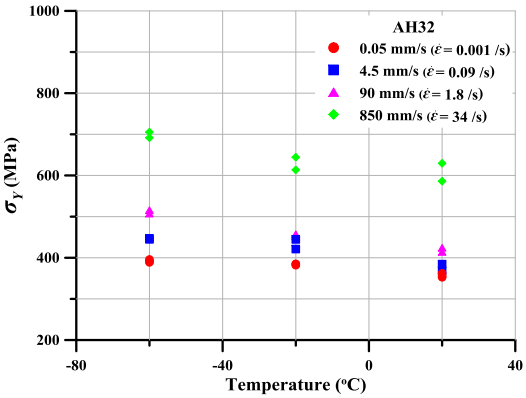

Figure A.23. Effects of low temperature on yield strength of high-tensile steel AH 32.

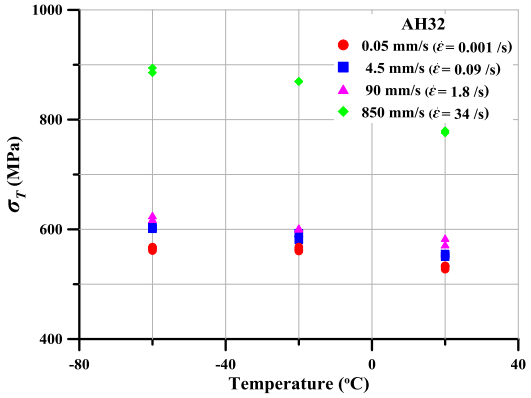

Figure A.24. Effects of low temperature on tensile strength of high-tensile steel AH 32.

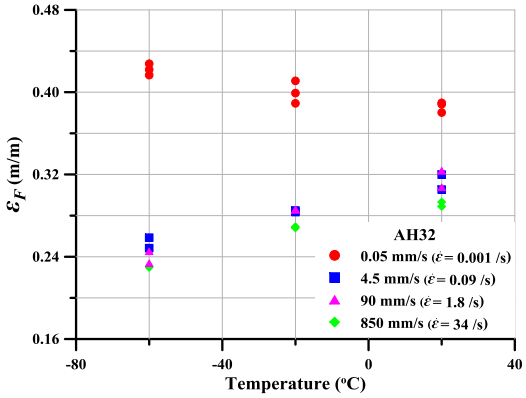

Figure A.25. Effects of low temperature on fracture (total breaking) strain of high-tensile steel AH 32.

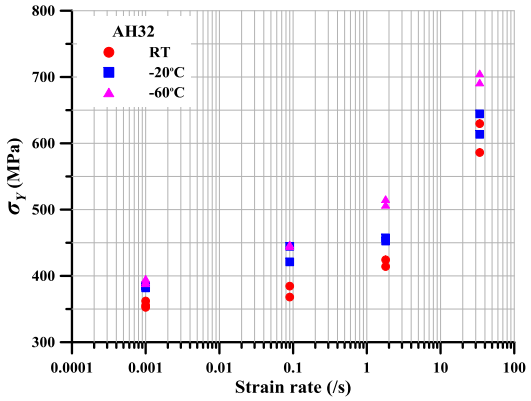

Figure A.26. Effects of stain rate on yield strength of high-tensile steel AH 32.

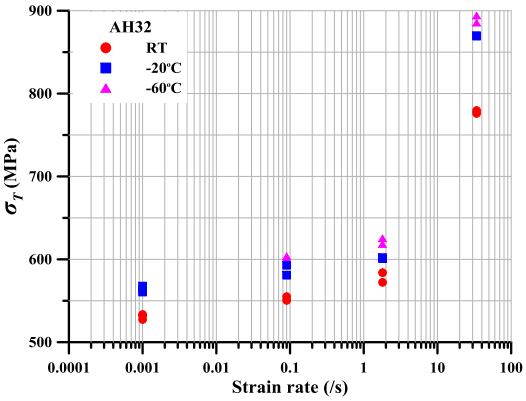

Figure A.27. Effects of strain rate on tensile strength of high-tensile steel AH 32.

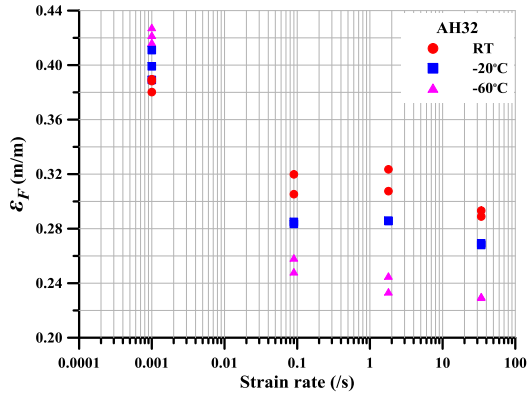

Figure A.28. Effects of strain rate on fracture (total breaking) of high-tensile steel AH 32.

A.4 High-tensile steel DH 32

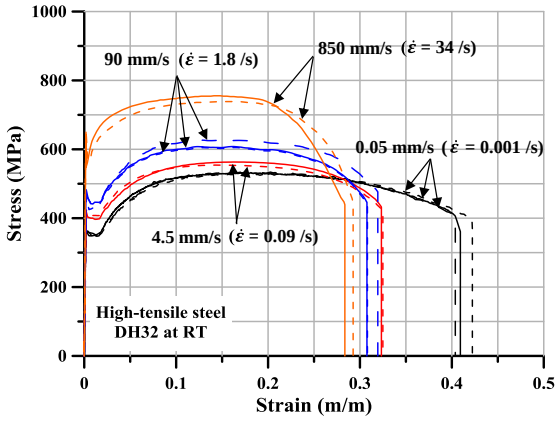

Figure A.29. Engineering stress- engineering strain curves for high-tensile steel DH 32 at room temperature.

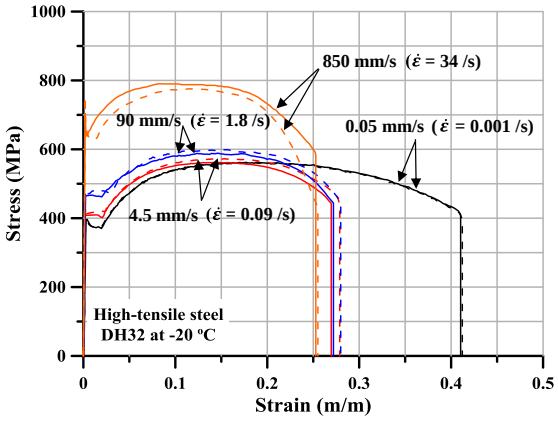

Figure A.30. Engineering stress- engineering strain curves for high-tensile steel DH 32 at -20 deg. C.

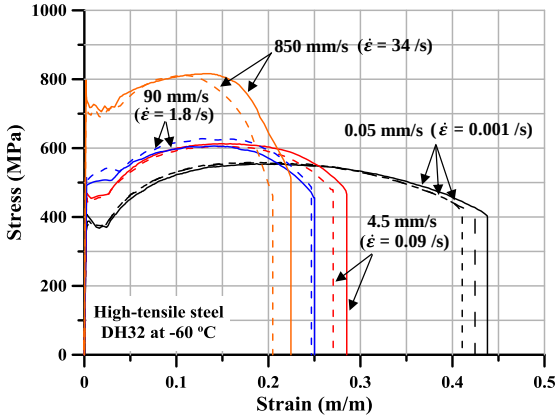

Figure A.31. Engineering stress- engineering strain curves for high-tensile steel DH 32 at -60 deg. C.

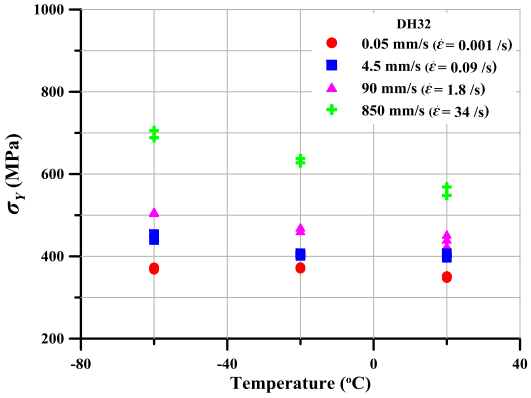

Figure A.32. Effects of low temperature on yield strength of high-tensile steel DH 32.

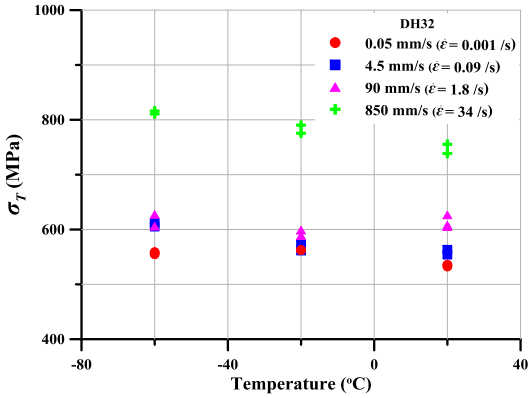

Figure A.33. Effects of low temperature on tensile strength of high-tensile steel DH 32.

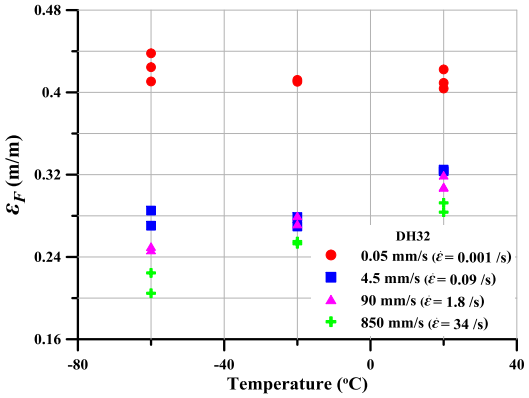

Figure A.34. Effects of low temperature on fracture (total breaking) strain of high-tensile steel DH 32.

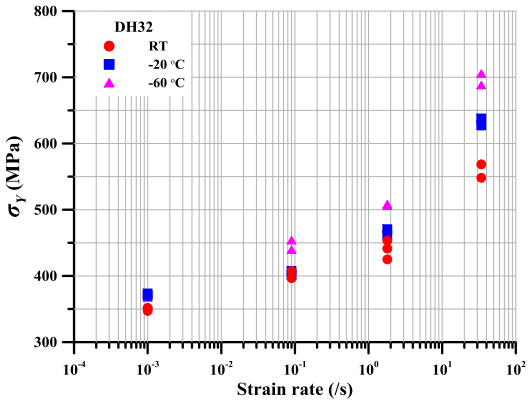

Figure A.35. Effects of strain rate on yield strength of high-tensile steel DH 32.

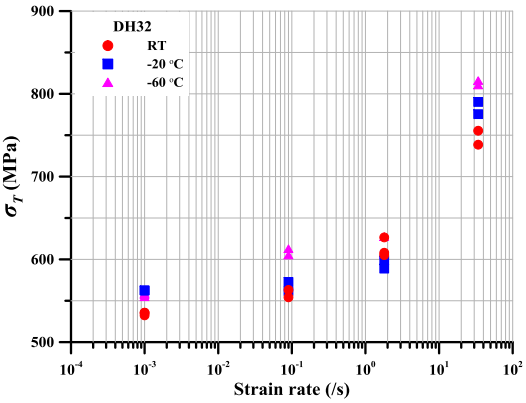

Figure A.36. Effects of strain rate on tensile strength of high-tensile steel DH 32.

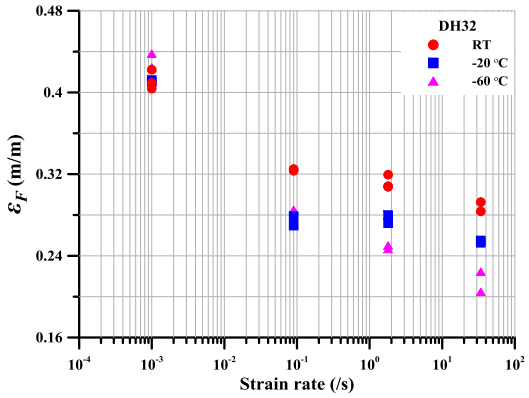

Figure A.37. Effects of strain rate on fracture (total breaking) strain of high-tensile steel DH 32.

A.5 High-tensile steel DH 36

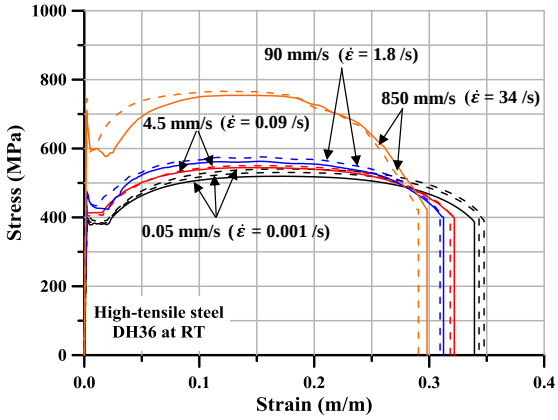

Figure A.38. Engineering stress- engineering strain curves for high-tensile steel DH 36 at room temperature.

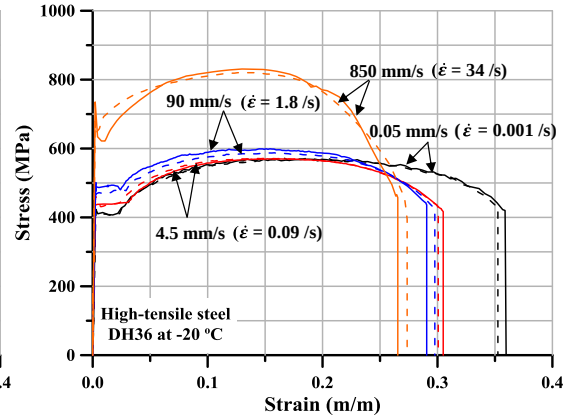

Figure A.39. Engineering stress- engineering strain curves for high-tensile steel DH 36 at -20 deg. C.

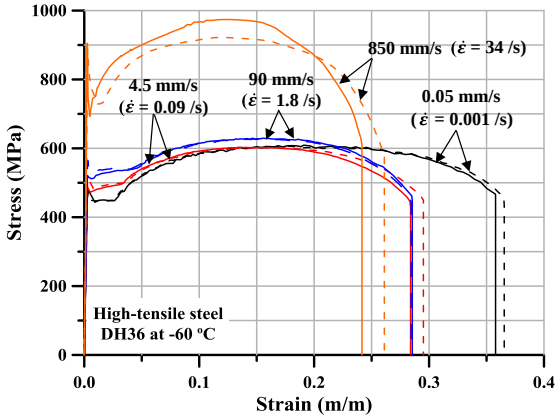

Figure A.40. Engineering stress- engineering strain curves for high-tensile steel DH 36 at -60 deg. C.

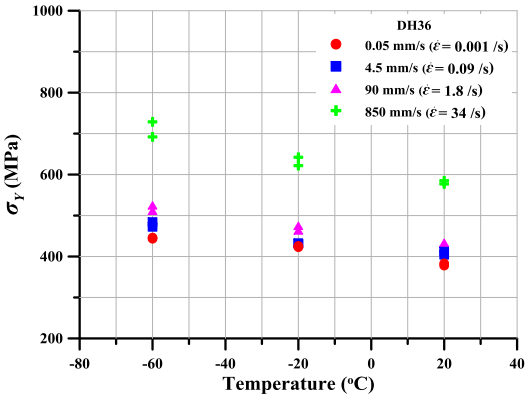

Figure A.41. Effects of low temperature on yield strength of high-tensile steel DH 36.

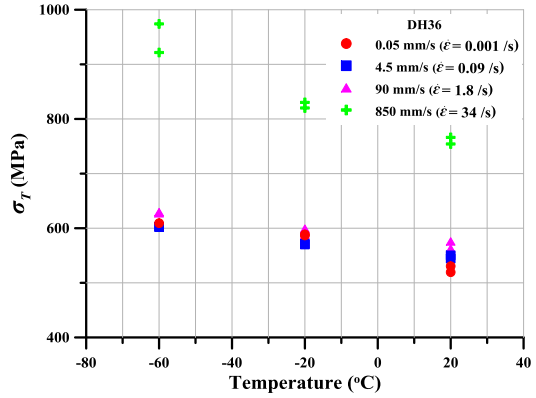

Figure A.42. Effects of low temperature on tensile strength of high-tensile steel DH 36.

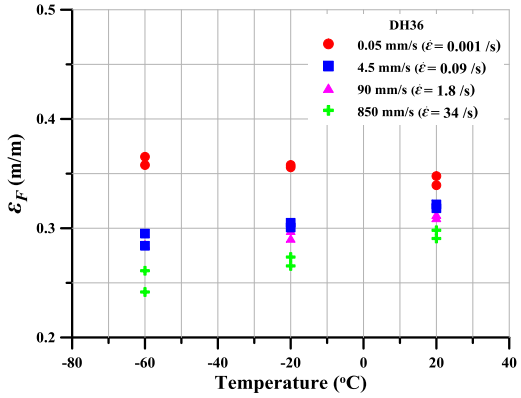

Figure A.43. Effects of low temperature on fracture (total breaking) strain of high-tensile steel DH 36.

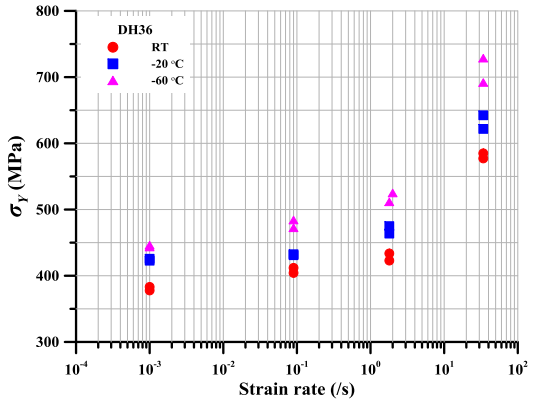

Figure A.44. Effects of strain rate on yield strength of high-tensile steel DH 36.

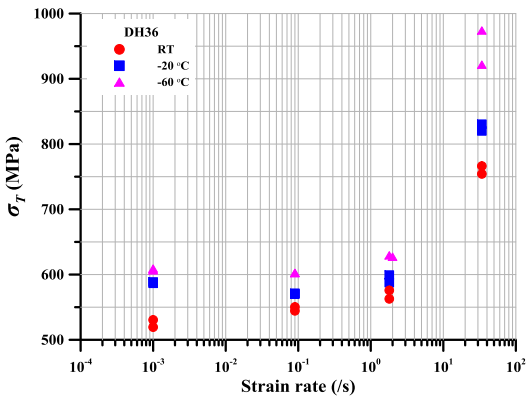

Figure A.45. Effects of strain rate on tensile strength of high-tensile steel DH 36.

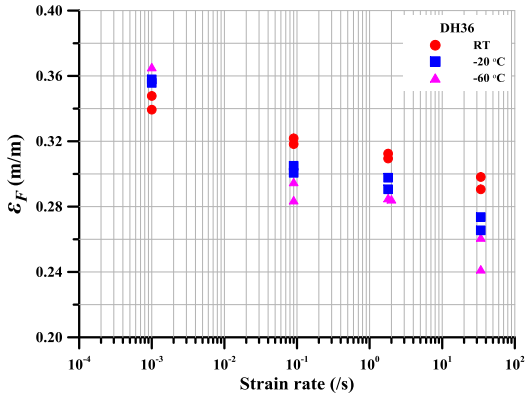

Figure A.46. Effects of stain rate on fracture (total breaking) strain of high-tensile steel DH 36.

A.6 Aluminum alloy 5083

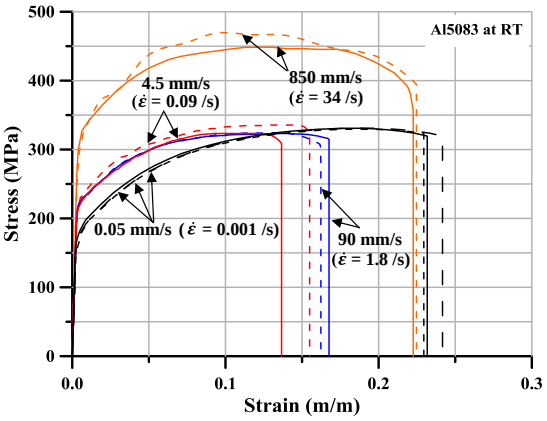

Figure A.47. Engineering stress- engineering strain curves for aluminum alloy 5083 at room temperature.

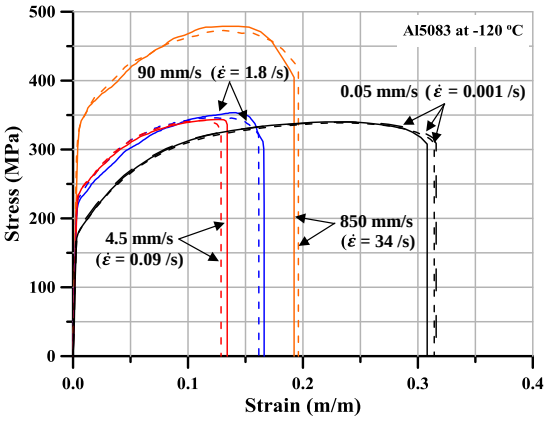

Figure A.48. Engineering stress- engineering strain curves for aluminum alloy 5083 at -120 deg. C.

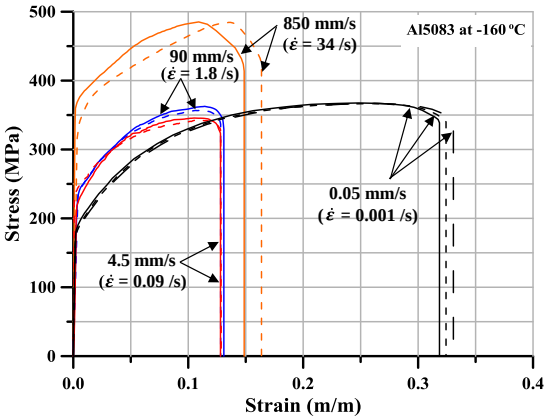

Figure A.49. Engineering stress- engineering strain curves for aluminum alloy 5083-O at -160 deg. C.

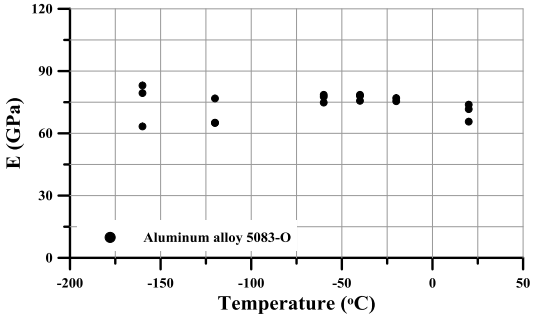

Figure A.50. Effects of low temperature on elastic modulus of aluminum alloy 5083-O.

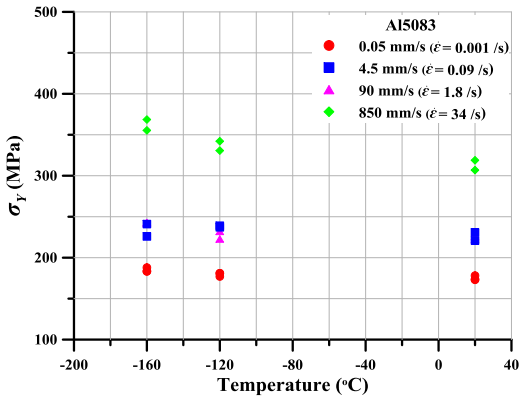

Figure A.51. Effects of low temperature on yield strength of aluminum alloy 5083-O.

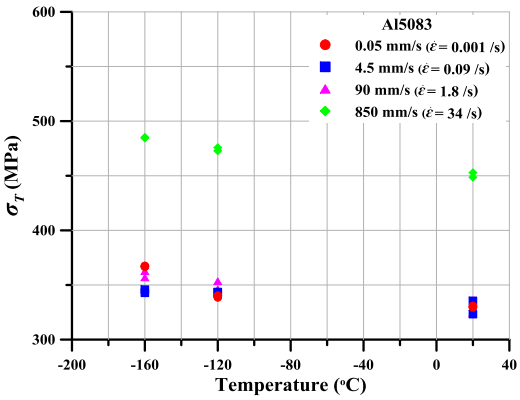

Figure A.52. Effects of low temperature on tensile strength of aluminum alloy 5083-O.

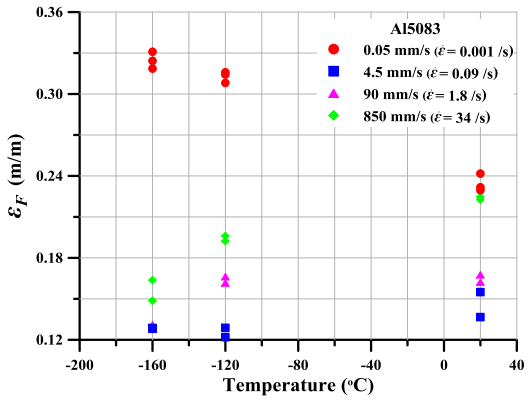

Figure A.53. Effects of low temperature on fracture (total breaking) strain of aluminum alloy 5083-O.

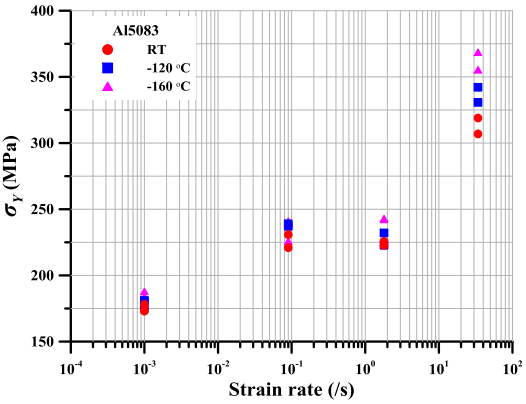

Figure A.54. Effects of strain rate on yield strength of aluminum alloy 5083-O.

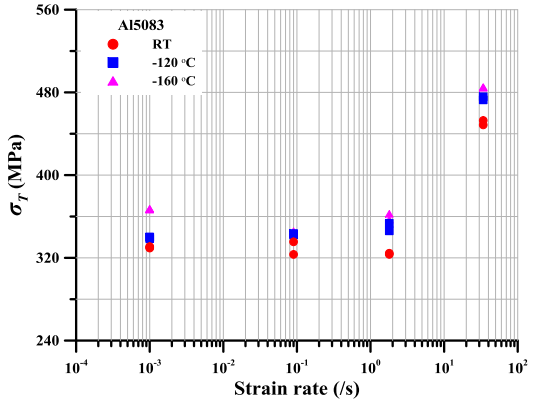

Figure A.55. Effects of strain rate on tensile strength of aluminum alloy 5083-O.

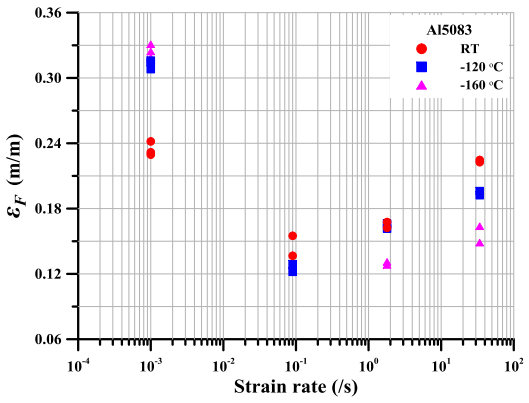

Figure A.56. Effects of strain rate on fracture (total breaking) strain of aluminum alloy 5083-O.

A.7 Stainless steel 304L

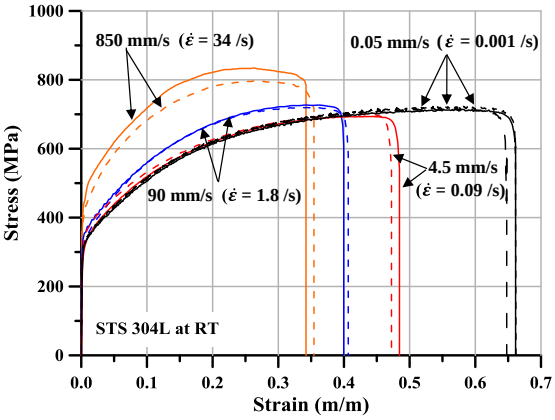

Figure A.57. Engineering stress- engineering strain curves for stainless steel 304L at room temperature.

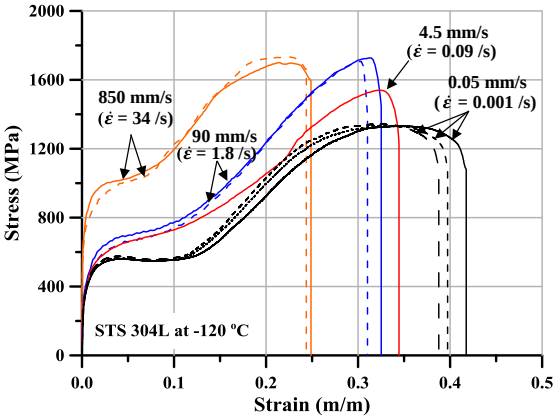

Figure A.58. Engineering stress- engineering strain curves for stainless steel 304L at -120 deg. C.

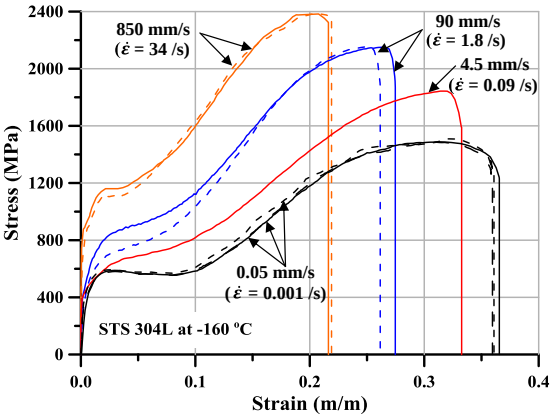

Figure A.59. Engineering stress- engineering strain curves for stainless steel 304L at -160 deg. C.

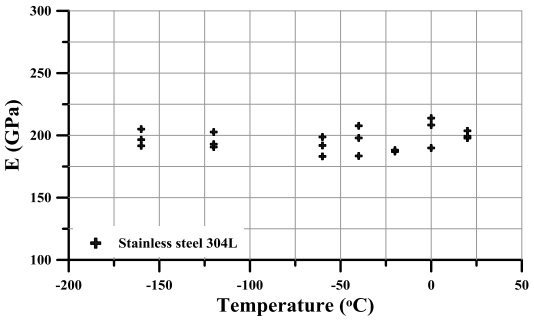

Figure A.60. Effects of low temperature on elastic modulus of stainless steel 304L.

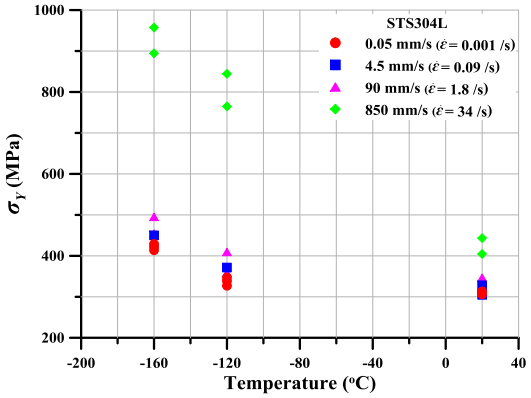

Figure A.61. Effects of low temperature on yield strength of stainless steel 304L.

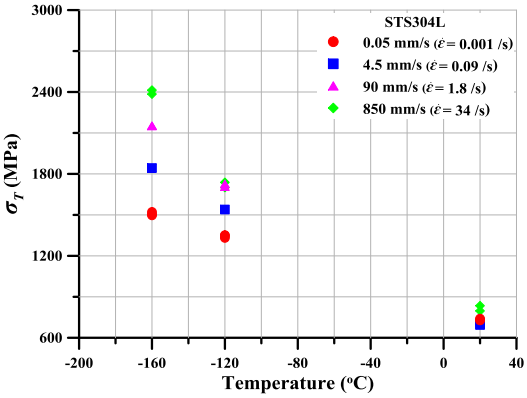

Figure A.62. Effects of low temperature on tensile strength of stainless steel 304L.

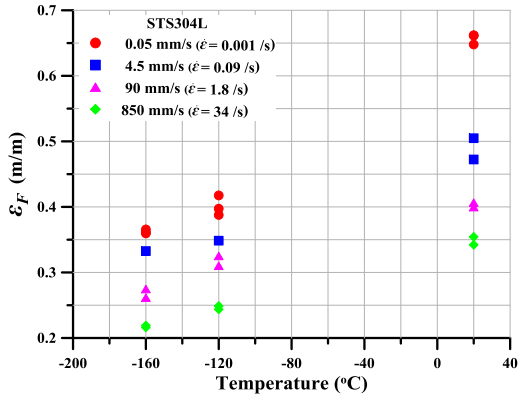

Figure A.63. Effects of low temperature on fracture (total breaking) strain of stainless steel 304L.

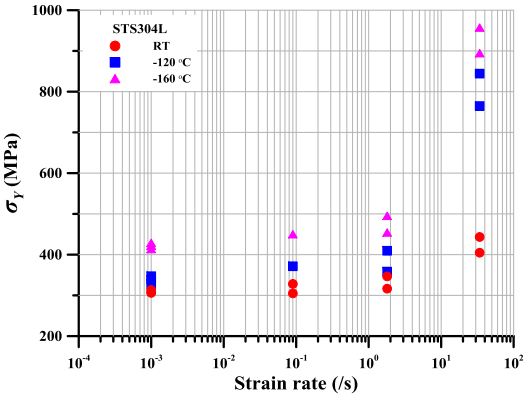

Figure A.64. Effects of strain rate on yield strength of stainless steel 304L.

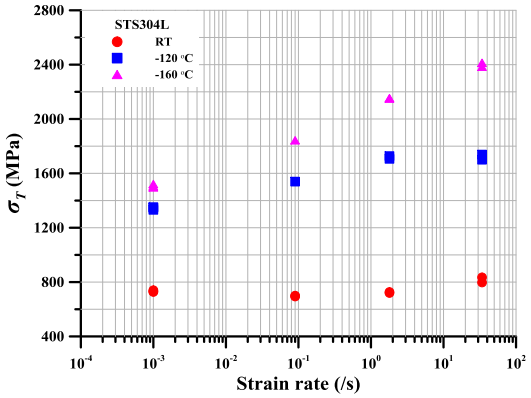

Figure A.65. Effects of strain rate on tensile strength of stainless steel 304L.

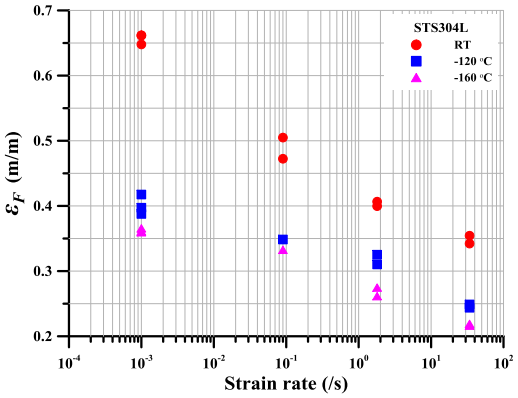

Figure A.66. Effects of strain rate on fracture (total breaking) strain of stainless steel 304L.

A.8 Work hardening

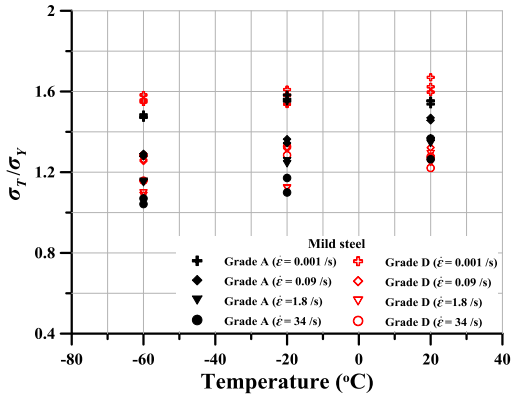

Figure A.67. Effects of low temperature on work hardening of mild steel - σ_T / σ_Y .

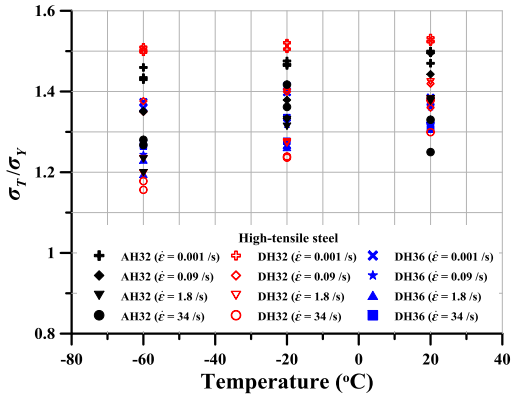

Figure A.68. Effects of low temperature on work hardening of high-tensile steel - σ_T / σ_Y .

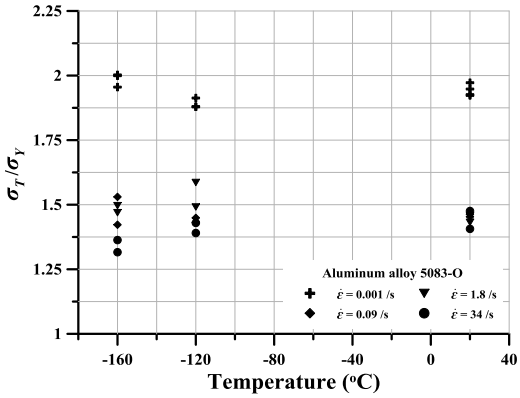

Figure A.69. Effects of low temperature on work hardening of aluminum alloy 5083-O - σ_T / σ_Y .

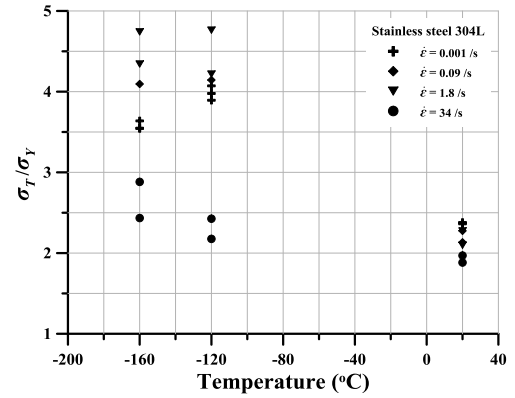

Figure A.70. Effects of low temperature on work hardening of stainless steel 304L - σ_T / σ_Y .

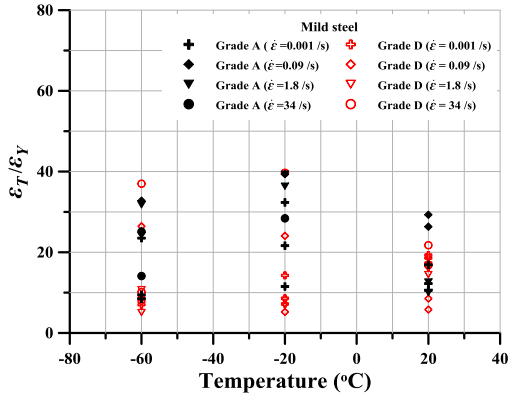

Figure A.71. Effects of low temperature on work hardening of mild steel - $\varepsilon_T / \varepsilon_Y$.

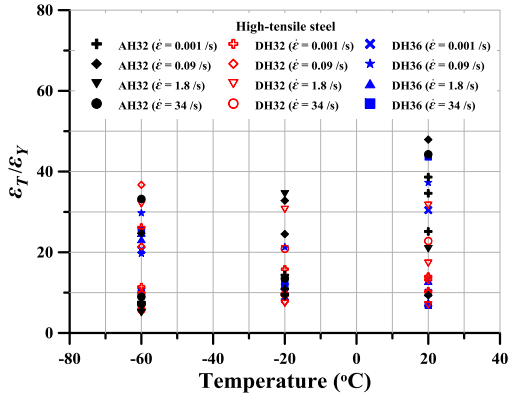

Figure A.72. Effects of low temperature and strain rate on work hardening of high-tensile steel - $\varepsilon_T / \varepsilon_Y$.

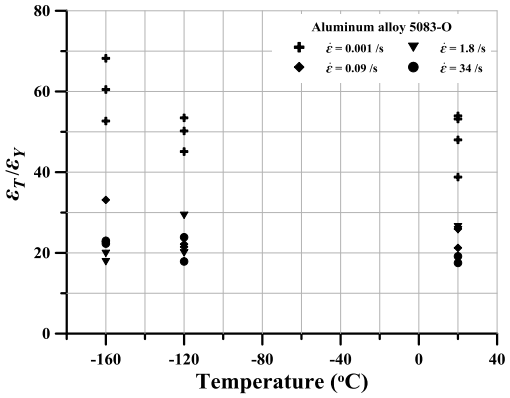

Figure A.73. Effects of low temperature and strain rate on work hardening of aluminum alloy 5083-O - $\varepsilon_T / \varepsilon_Y$.

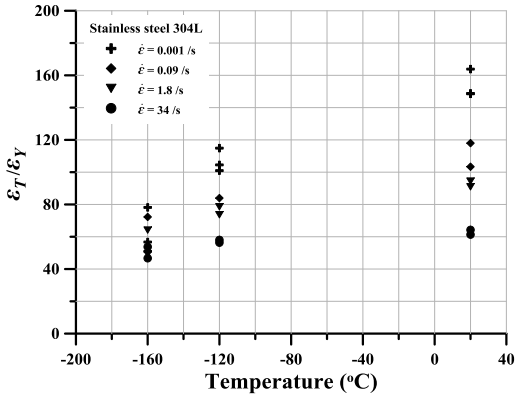

Figure A.74. Effects of low temperature and strain rate on work hardening of stainless steel 304L - $\varepsilon_T / \varepsilon_Y$.

A.9 Necking

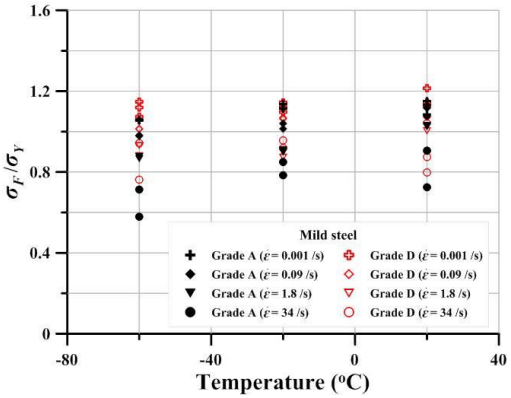

Figure A.75. Effects of low temperature and strain rate on necking of mild steel - σ_F / σ_Y .

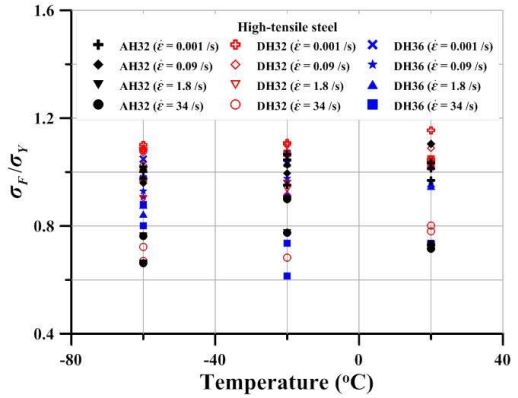

Figure A.76. Effects of low temperature and strain rate on necking of high-tensile steel - σ_F / σ_Y .

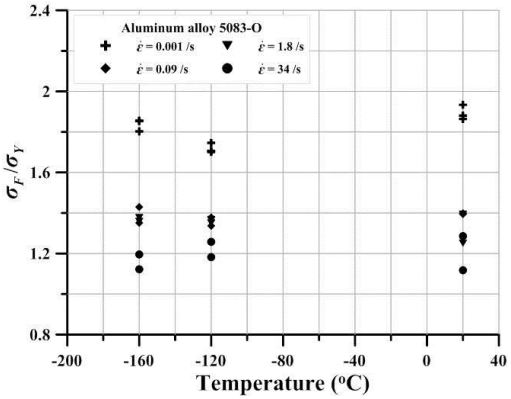

Figure A.77. Effects of low temperature and strain rate on necking of aluminum alloy 5083-O - σ_F / σ_Y .

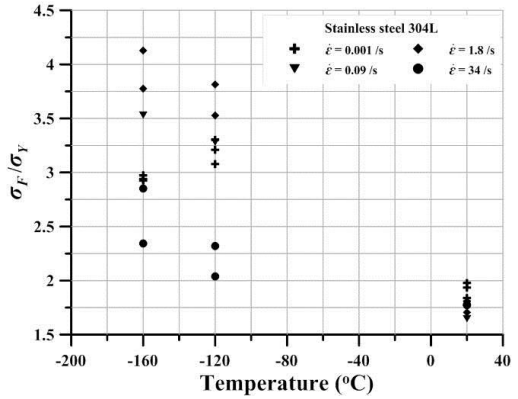

Figure A.78. Effects of low temperature and strain rate on necking of stainless steel 304L - σ_F / σ_Y .

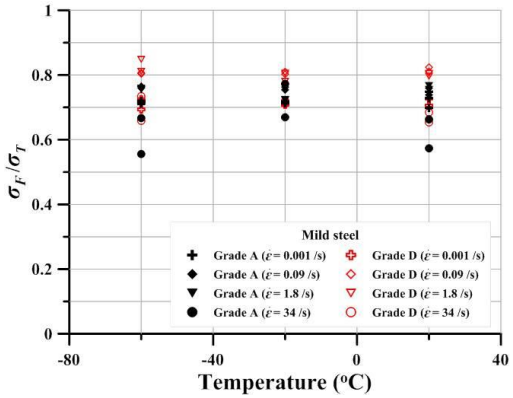

Figure A.79. Effects of low temperature and strain rate on necking of mild steel - σ_F / σ_T .

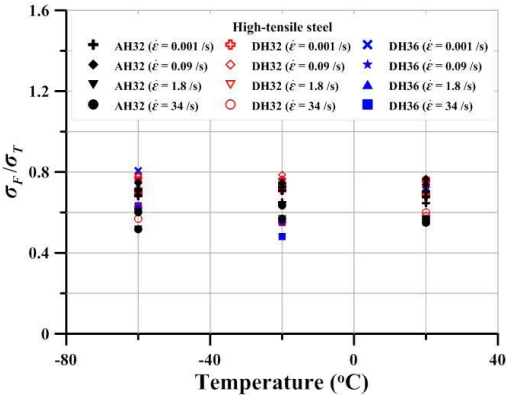

Figure A.80. Effects of low temperature and strain rate on necking of high-tensile steel - σ_F / σ_T .

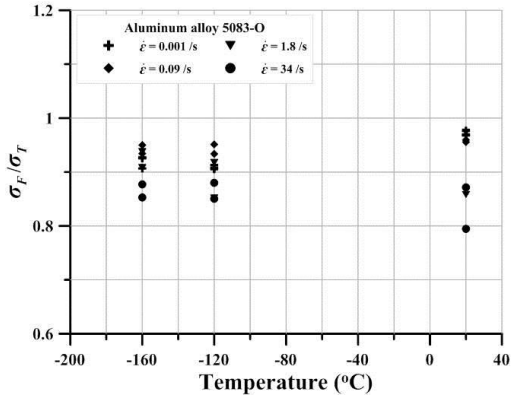

Figure A.81. Effects of low temperature and strain rate on necking of aluminum alloy 5083-O - σ_F / σ_T .

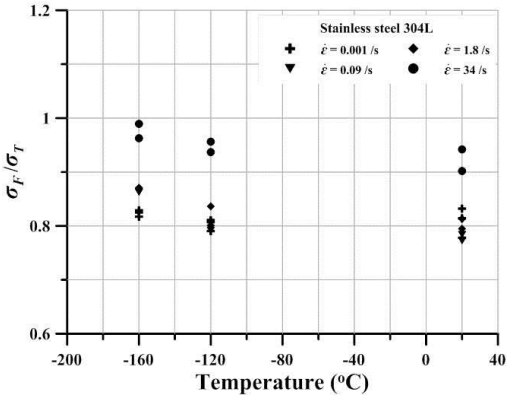

Figure A.82. Effects of low temperature and strain rate on necking of stainless steel 304L - σ_F / σ_T .

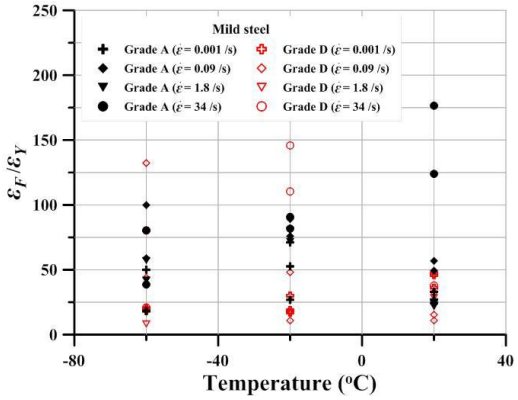

Figure A.83. Effects of low temperature and strain rate on necking of mild steel - ε_F / ε_Y .

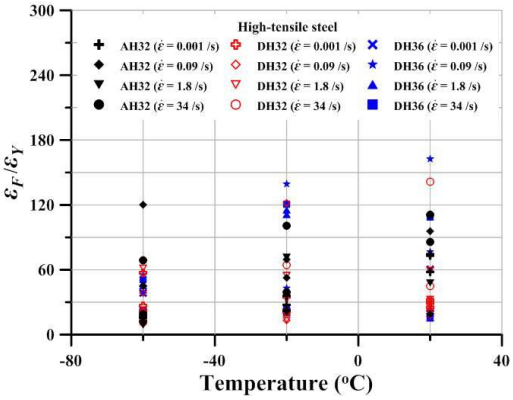

Figure A.84. Effects of low temperature and strain rate on necking of high-tensile steel - ε_F / ε_Y .

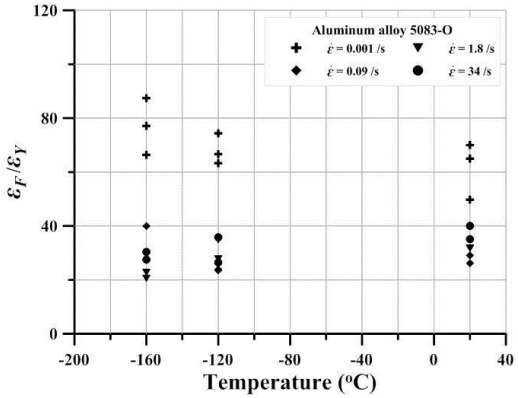

Figure A.85. Effects of low temperature and strain rate on necking of aluminum alloy 5083-O - ε_F / ε_Y .

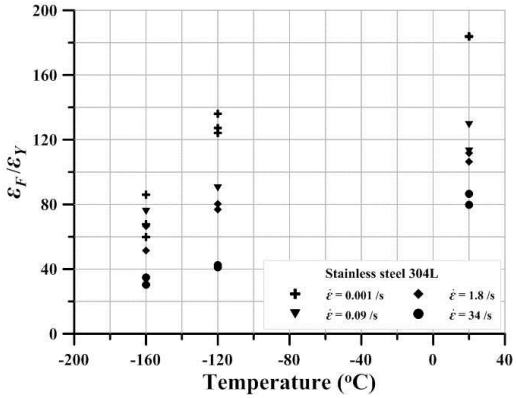

Figure A.86. Effects of low temperature and strain rate on necking of stainless steel 304L - ε_F / ε_Y .

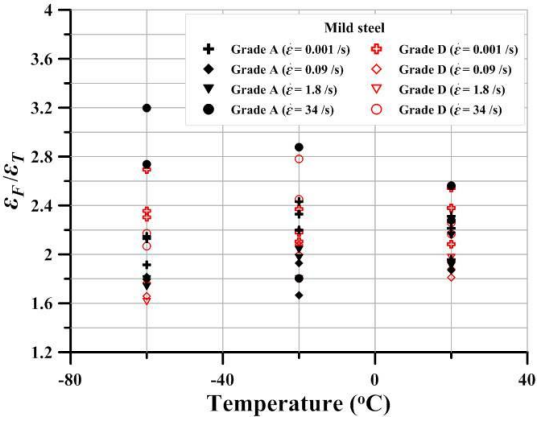

Figure A.87. Effects of low temperature and strain rate on necking of mild steel - ε_F / ε_T .

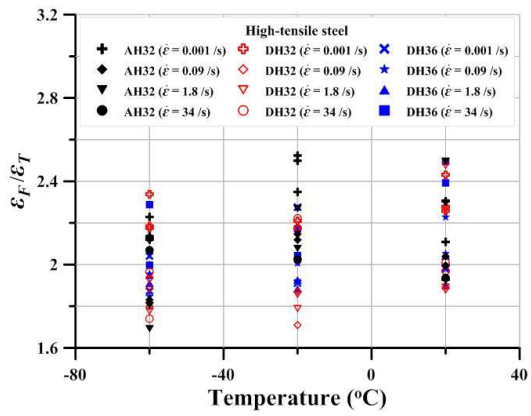

Figure A.88. Effects of low temperature and strain rate on necking of high-tensile steel - ε_F / ε_T .

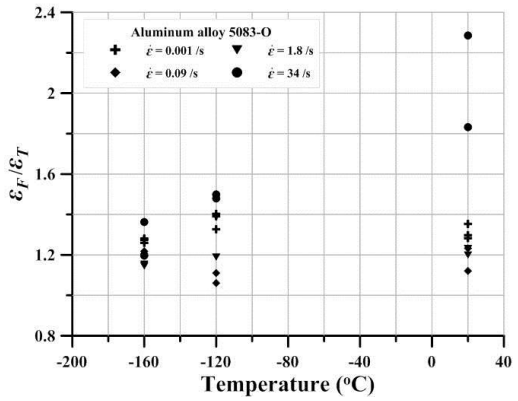

Figure A.89. Effects of low temperature and strain rate on necking of aluminum alloy 5083-O - ε_F / ε_T .

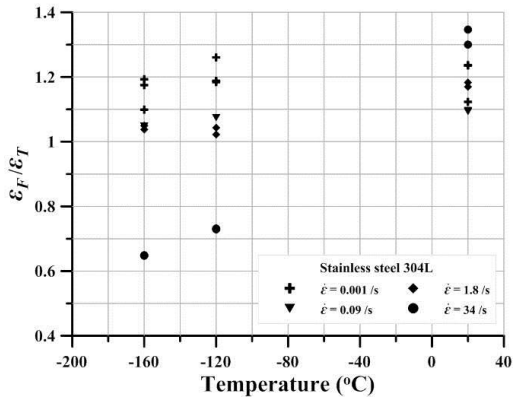

Figure A.90. Effects of low temperature and strain rate on necking of stainless steel 304L - ε_F / ε_T .

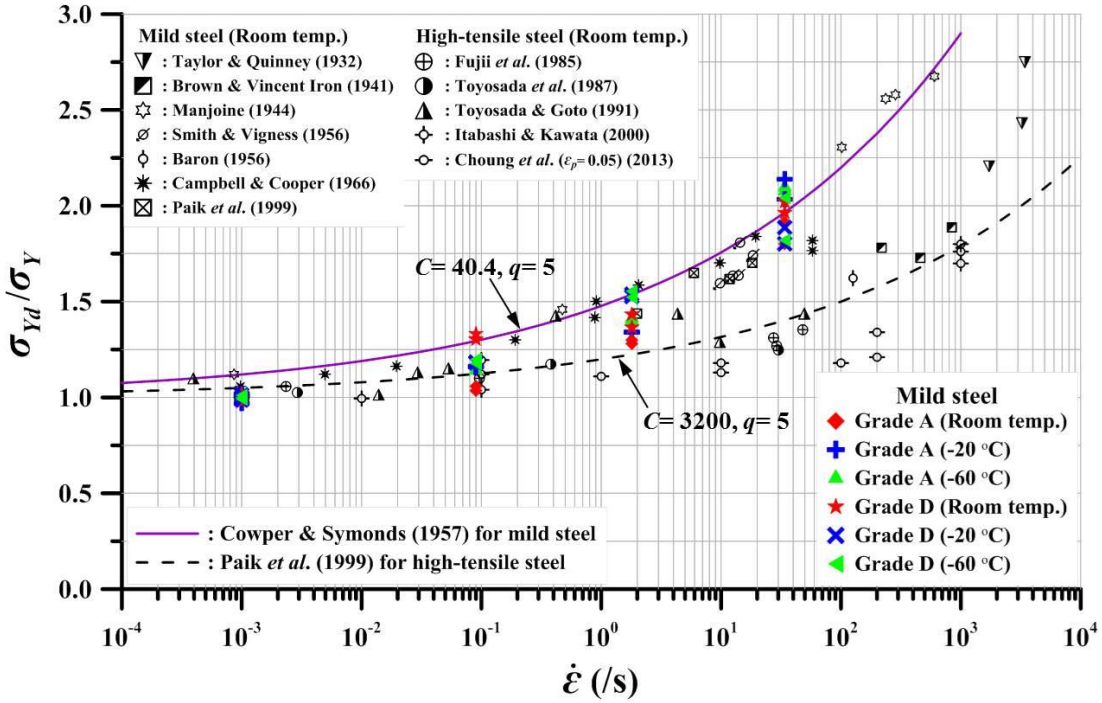

Figure A.91. Dynamic yield strength of mild steel against strain rates and low temperatures.

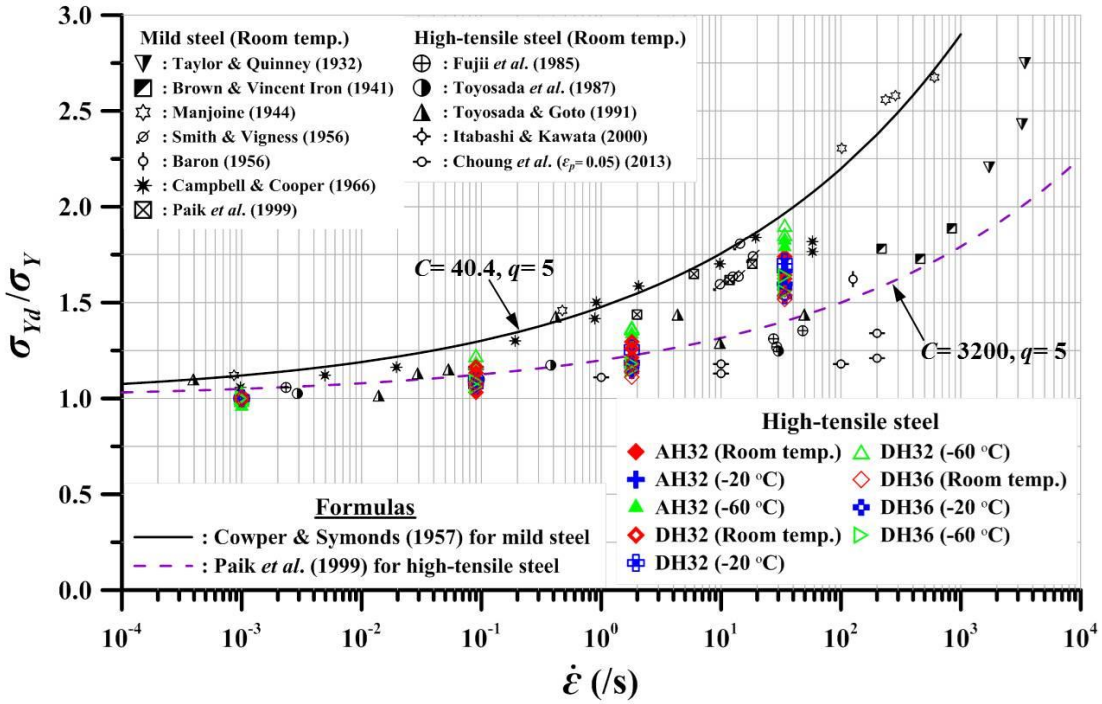

Figure A.92. Dynamic yield strength of high-tensile steel against strain rates and low temperatures.

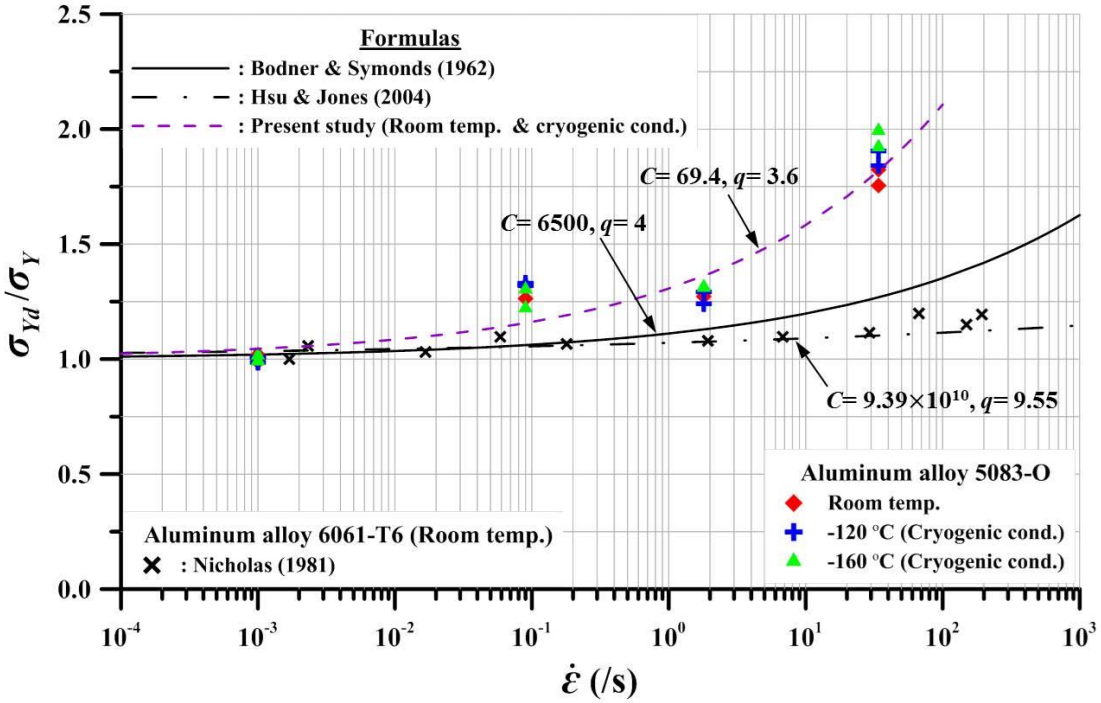

Figure A.93. Dynamic yield strength of aluminum alloy 5083-O against strain rates and low temperatures.

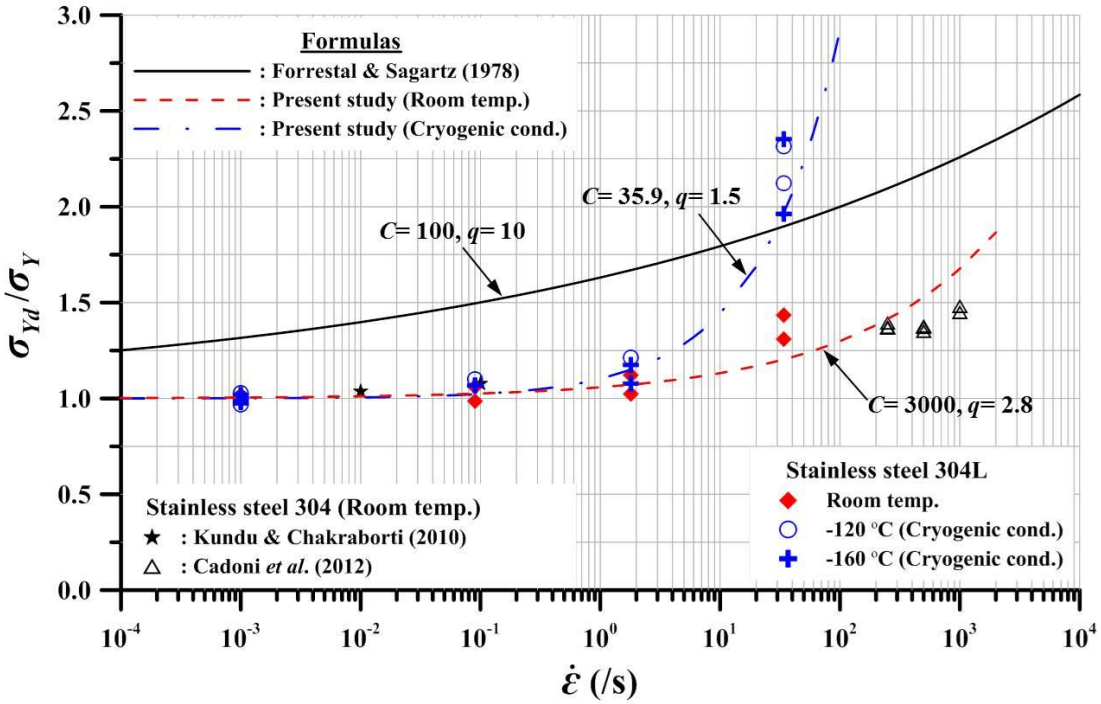

Figure A.94. Dynamic yield strength of stainless steel 304L against strain rates and low temperatures.

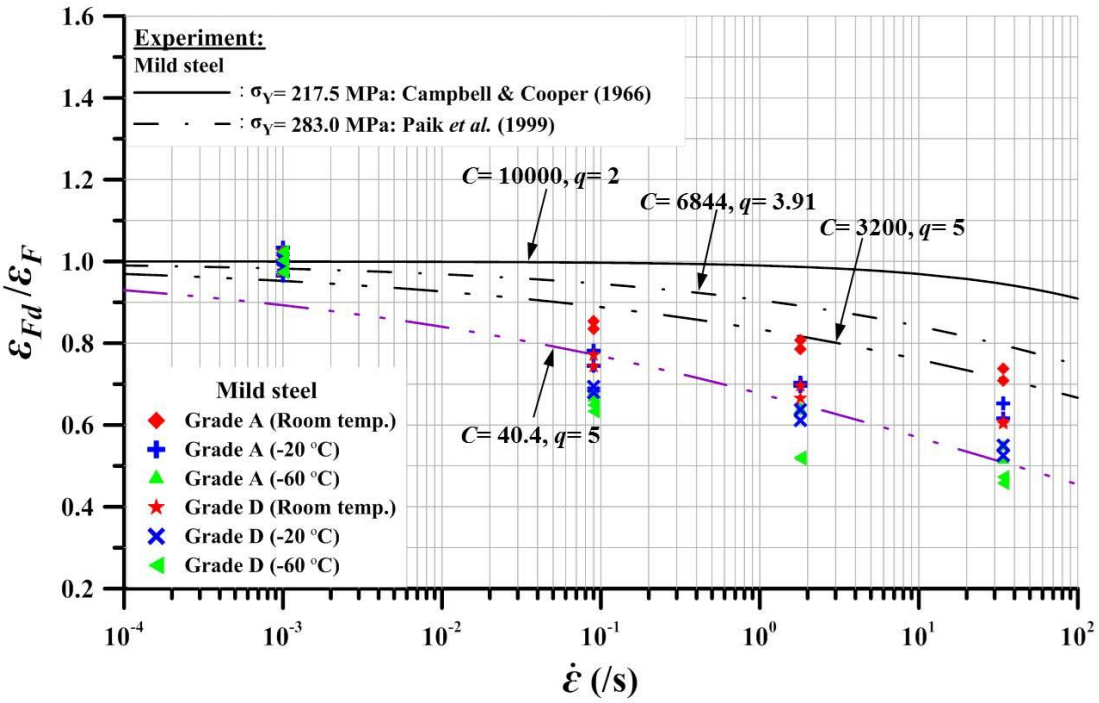

Figure A.95. Dynamic fracture strain of mild steel against strain rates and low temperatures.

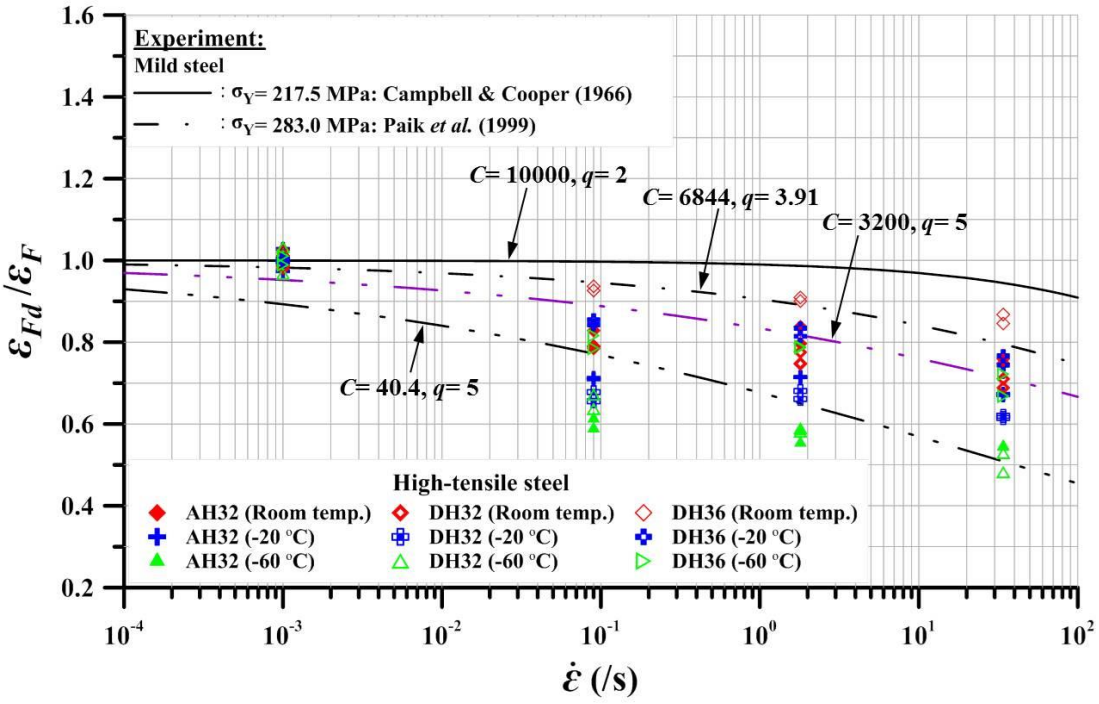

Figure A.96. Dynamic fracture strain of high-tensile steel against strain rates and low temperatures.

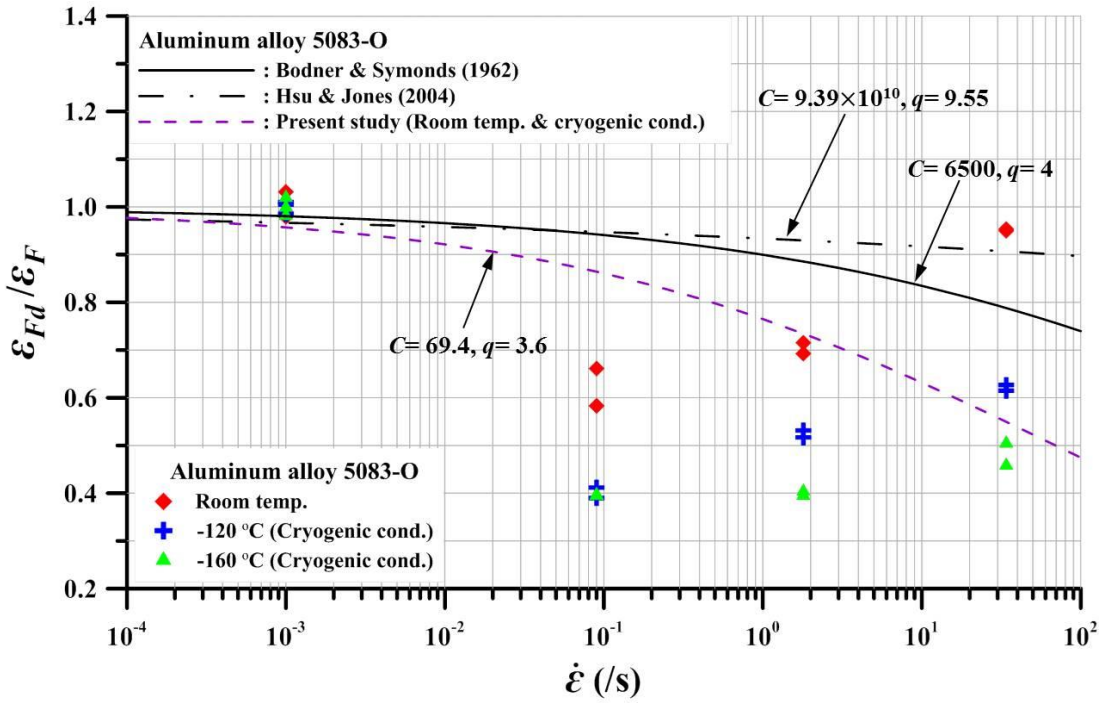

Figure A.97. Dynamic fracture strain of aluminum alloy 5083-O against strain rates and low temperatures.

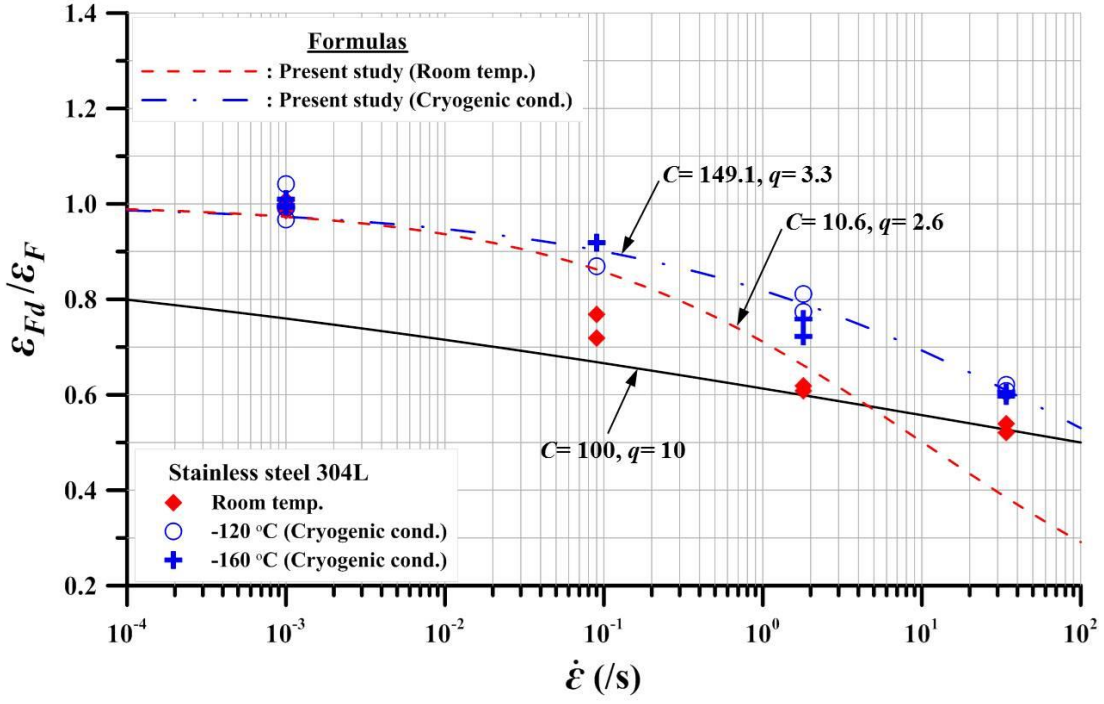

Figure A.98. Dynamic fracture strain of stainless steel against strain rates and low temperatures.