Vessfire Simulation Report

Report generated: 21.01.2014 13:08:17

Rupture summary

No ruptures occurred.

Case Definition

Vessel 23-VG02A

- Flame:
  - Longitudinal start: 45 %
  - Longitudinal end: 55 %
  - Angle from top: 30°
  - Exposed arc: 35°
  - Impinging Flame: Yes
- First blow-down valve:
  - Diameter: 0,06344 m
  - Contraction factor: 80 %
  - Delay: 0 min
- BDV position:
  - Longitudinal: 100 %
  - Angular (from top): 0°
- Blow-down line:
  - Diameter: 0,1143 m
  - Wall thickness: 0,006 m
  - Length: 5,148 m
- Pressure safety valve:
  - Type: Square
  - Diameter: 0,054 m
  - Contraction factor: 80 %

        - Longitudinal position: 82 %
        - Angular position (from top): 0°
        - Opening pressure: 6 500 kPa
- External longitudinal stress: 30 MPa
- Stress factor: 100 %
- Failure criterion: UTS
- Material: Duplex_22Cr
- Material strength: 600 MPa
- Outer diameter: 3,426 m
- Wall thickness: 0,044 m
- Corrosion allowance: 0 m
- Length: 6,437 m
- Operating pressure: 3 809 kPa
- Operating inventory temperature: 47,35 °C
- Operating shell temperature: 25 °C
- Hydrocarbon level: 1 m
- Water level: 0 m
- Backpressure: 100 kPa
- Environment temperature: 9,85 °C
- Emissivity: 85 %
- Orientation: Vertical

Pipes

- Common pipe data:
    - Heat load "Background"
        - Environment temperature: 6,85 °C
        - Emissivity: 83 %
        - Heat-transfer coefficient: 30 W/m² K
        - Impinging Flame: Yes
    - Heat load "PeakHeat"
        - Environment temperature: 6,85 °C
        - Emissivity: 83 %
        - Heat-transfer coefficient: 100 W/m² K
        - Impinging Flame: Yes
    - Maximum ruptured pipes: 0
    - Contraction factor: 80 %
- Pipe 6-PS-23-062-CS71
    - Material: Duplex_22Cr
    - Outer diameter: 0,2191 m
    - Wall thickness: 0,0071 m
    - Length: 8,846 m
    - Mill tolerance: 0 %
    - Corrosion allowance: 0 m
    - Peak load: PeakHeat, see common data
    - Background load: Background, see common data
    - Material strength: 620 MPa

    - External longitudinal stress: 30 MPa
    - Stress factor: 100 %
    - Rupture criterion: UTS
    - Initial inventory temperature: 9,85 °C
    - Initial shell temperature: 14 °C
    - Phase: gas
    - Insulation: Foamglas; Thickness: 0,0071 m; Length: 8,846 m
    - Insulation: Carbowool_128; Thickness: 0,001 m; Length: 8,846 m
- Pipe 16-PR-23-101-CS71
    - Material: Duplex_22Cr
    - Outer diameter: 0,4572 m
    - Wall thickness: 0,0127 m
    - Length: 2,107 m
    - Mill tolerance: 12 %
    - Corrosion allowance: 0,003 m
    - Peak load: PeakHeat, see common data
    - Background load: Background, see common data
    - Material strength: 620 MPa
    - External longitudinal stress: 30 MPa
    - Stress factor: 100 %
    - Rupture criterion: UTS
    - Initial inventory temperature: 9,85 °C
    - Initial shell temperature: 14 °C
    - Phase: gas
- Pipe 6-PR-23-154-CS71
    - Material: Duplex_22Cr
    - Outer diameter: 0,2191 m
    - Wall thickness: 0,0071 m
    - Length: 1,953 m
    - Mill tolerance: 0 %
    - Corrosion allowance: 0 m
    - Peak load: PeakHeat, see common data
    - Background load: Background, see common data
    - Material strength: 620 MPa
    - External longitudinal stress: 30 MPa
    - Stress factor: 100 %
    - Rupture criterion: UTS
    - Initial inventory temperature: 9,85 °C
    - Initial shell temperature: 14 °C
    - Phase: liquid
- Pipe 12-PS-23-051-CS71
    - Material: Duplex_22Cr
    - Outer diameter: 0,3747 m
    - Wall thickness: 0,0095 m
    - Length: 25,589 m
    - Mill tolerance: 0 %

- Corrosion allowance: 0 m
- Peak load: PeakHeat, see common data
- Background load: Background, see common data
- Material strength: 620 MPa
- External longitudinal stress: 30 MPa
- Stress factor: 100 %
- Rupture criterion: UTS
- Initial inventory temperature: 9,85 °C
- Initial shell temperature: 14 °C
- Phase: liquid

Components

- C1: 75,868 %
- C2: 10,0594 %
- C3: 5,77988 %
- H2O: 5 %
- C4: 1,5507 %
- IC4: 0,523613 %
- C10: 0,352432 %
- C8: 0,342362 %
- C5: 0,241668 %
- IC5: 0,231598 %
- C6: 0,0503474 %

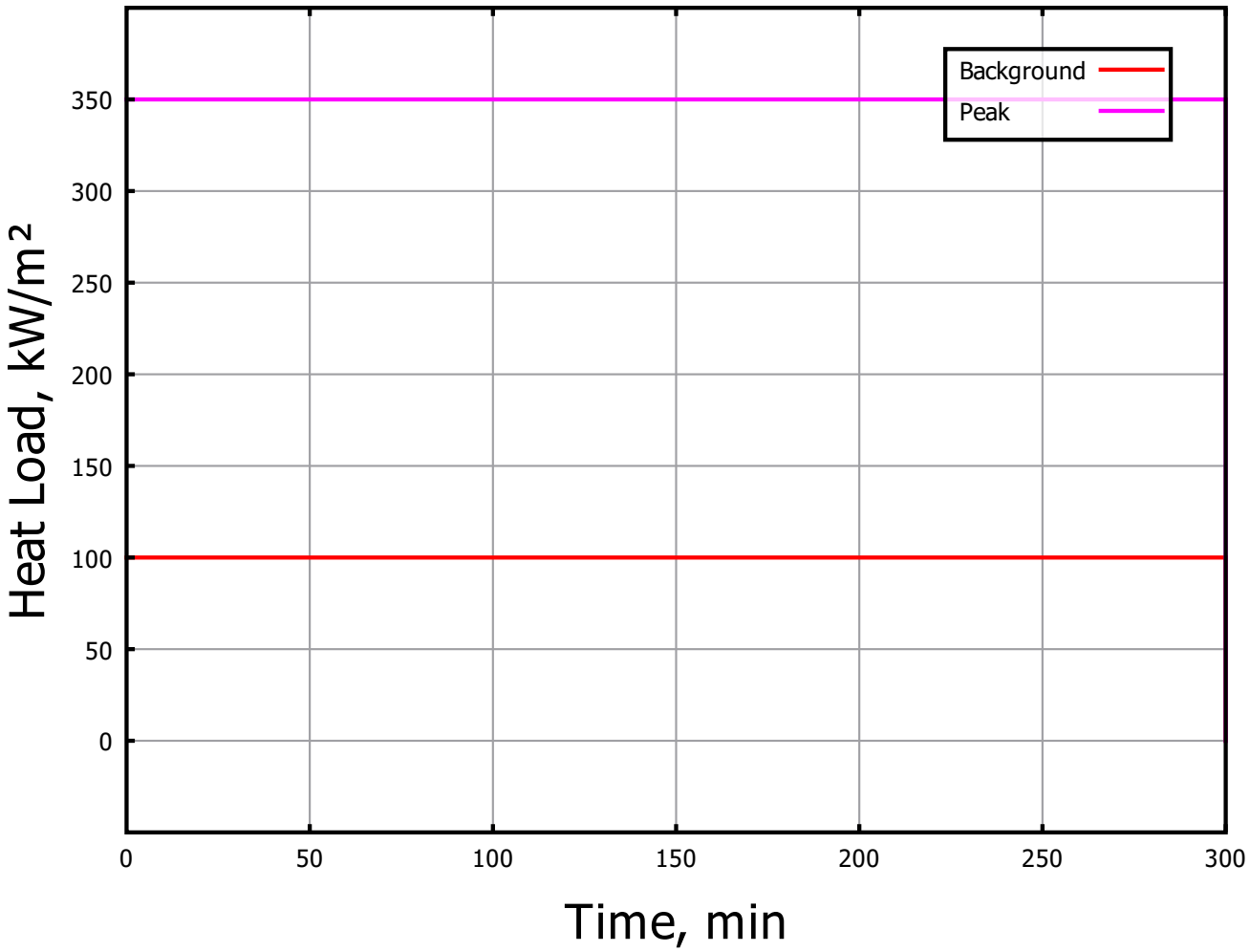

Figure 1: Heat loads for the vessel

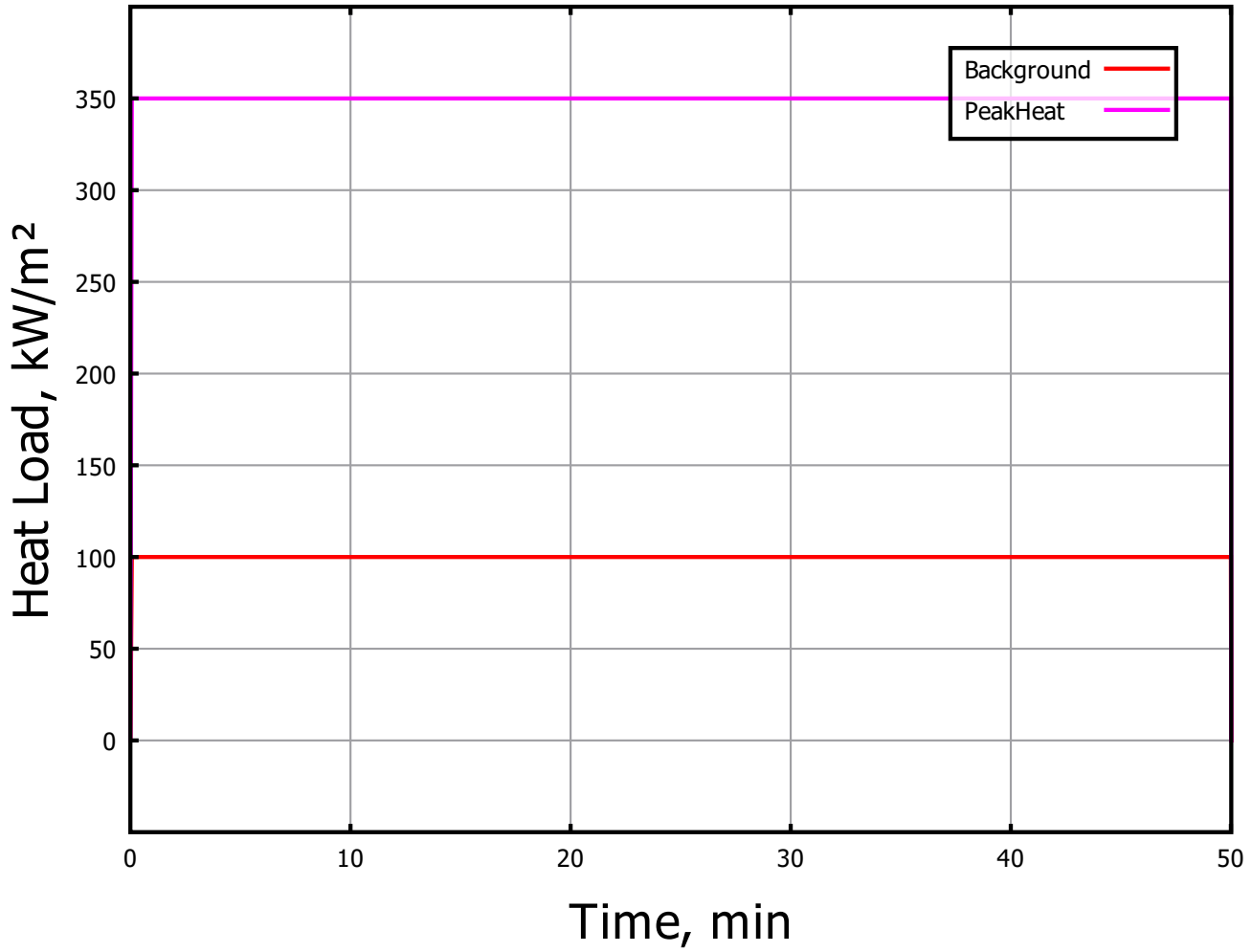

Figure 2: Heat loads for pipes

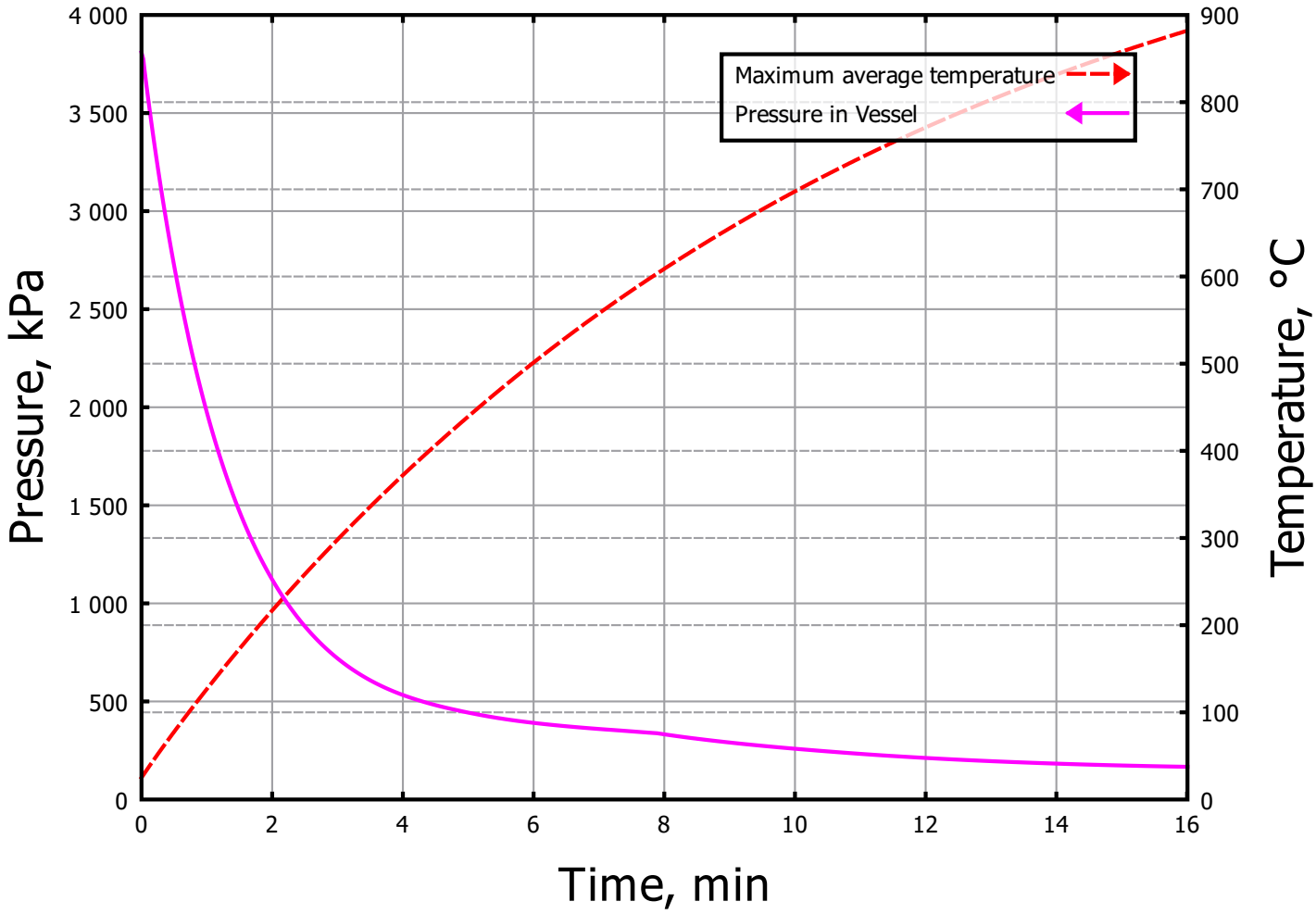

Figure 3: Pressure in the vessel

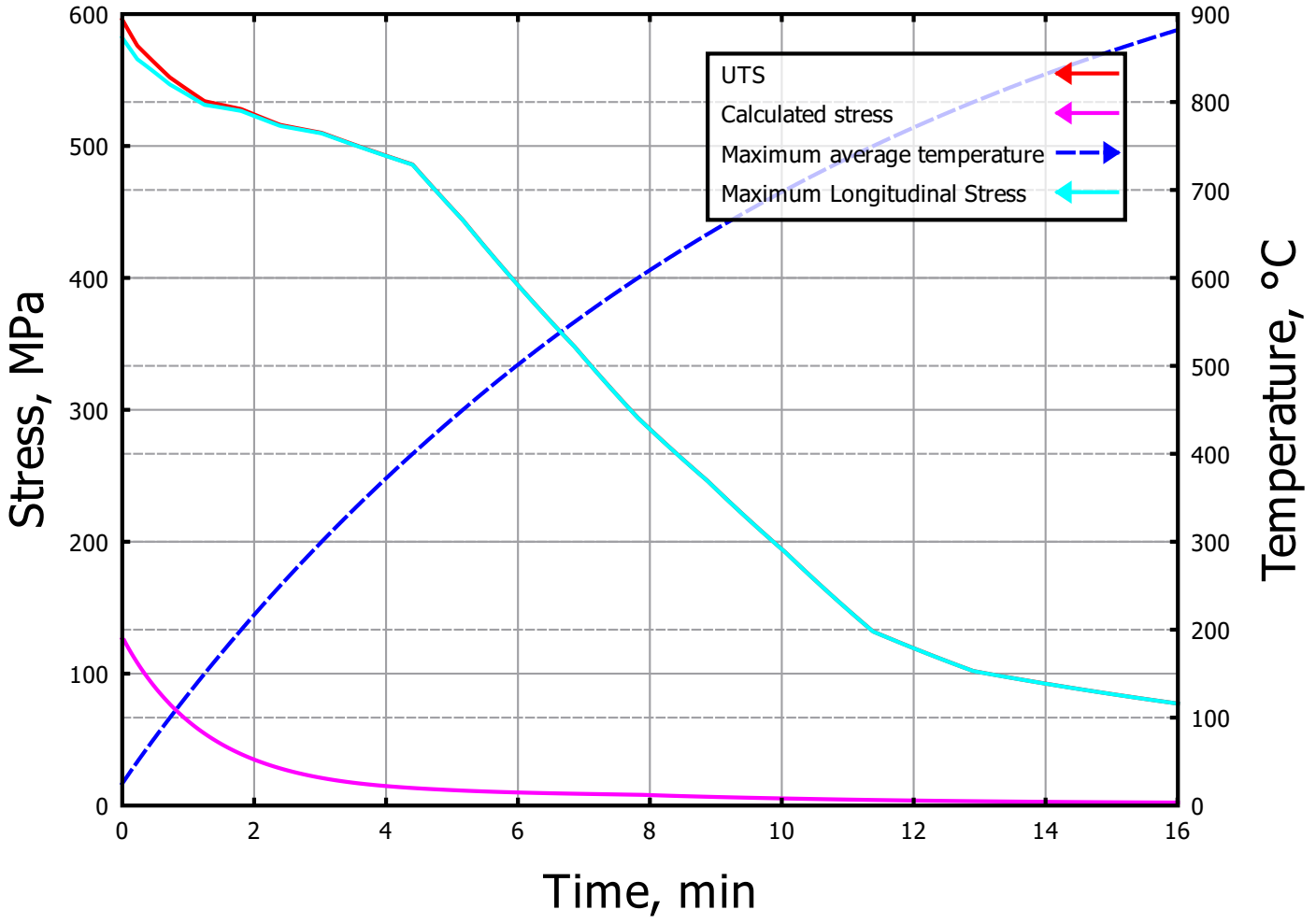

Figure 4: Stress in the vessel

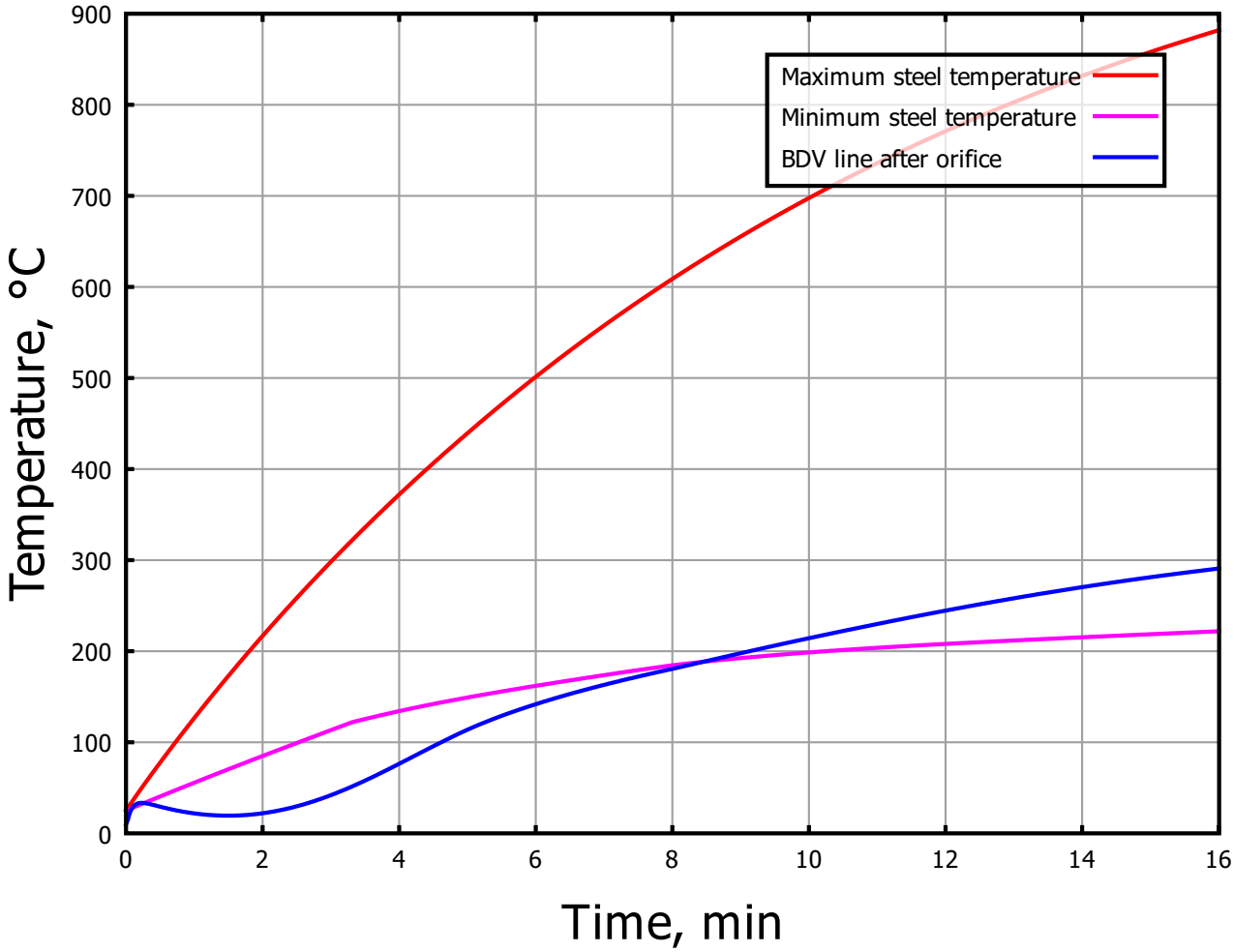

Figure 5: Steel temperatures

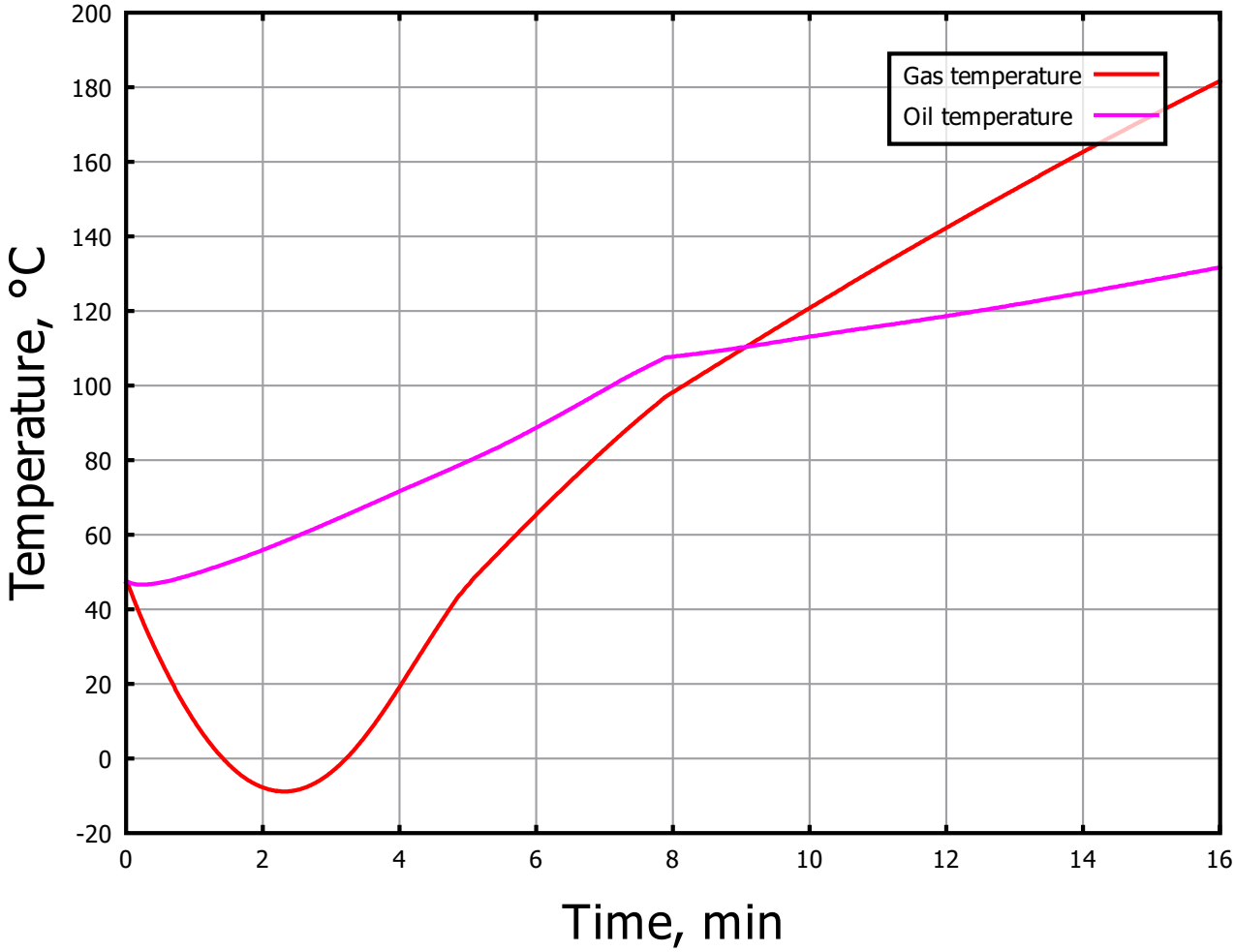

Figure 6: Content temperatures

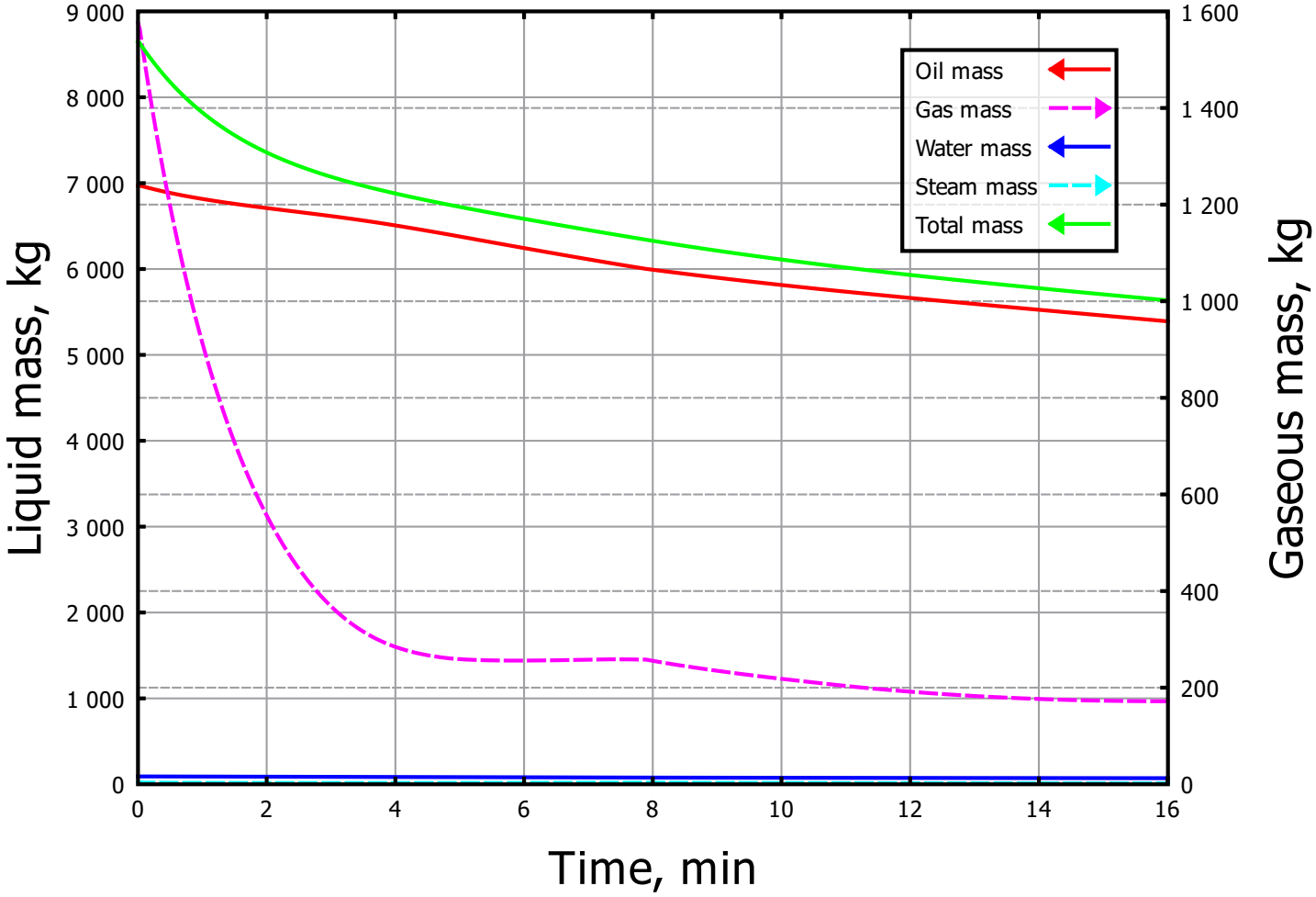

Figure 7: Segment masses

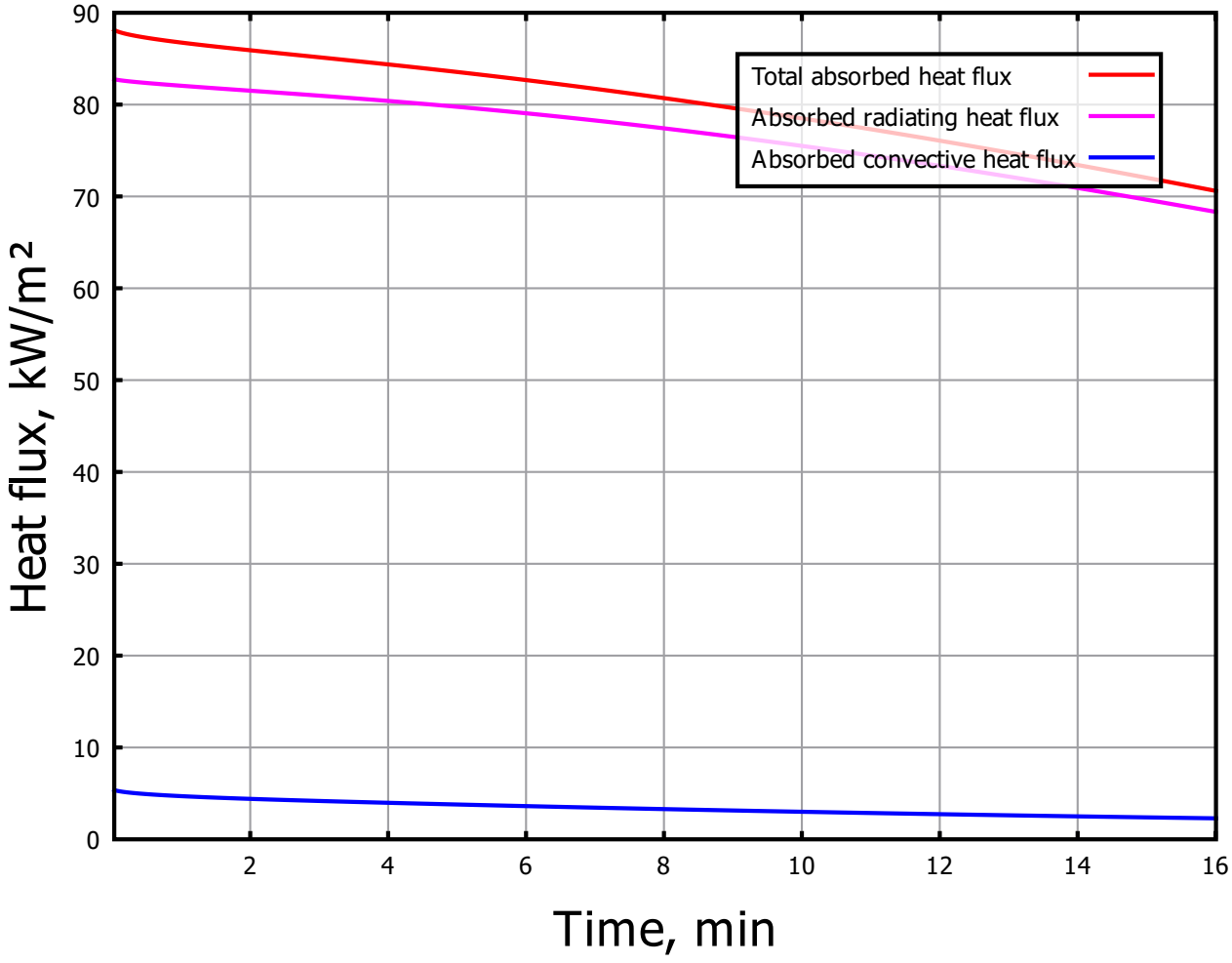

Figure 8: Absorbed heat flux

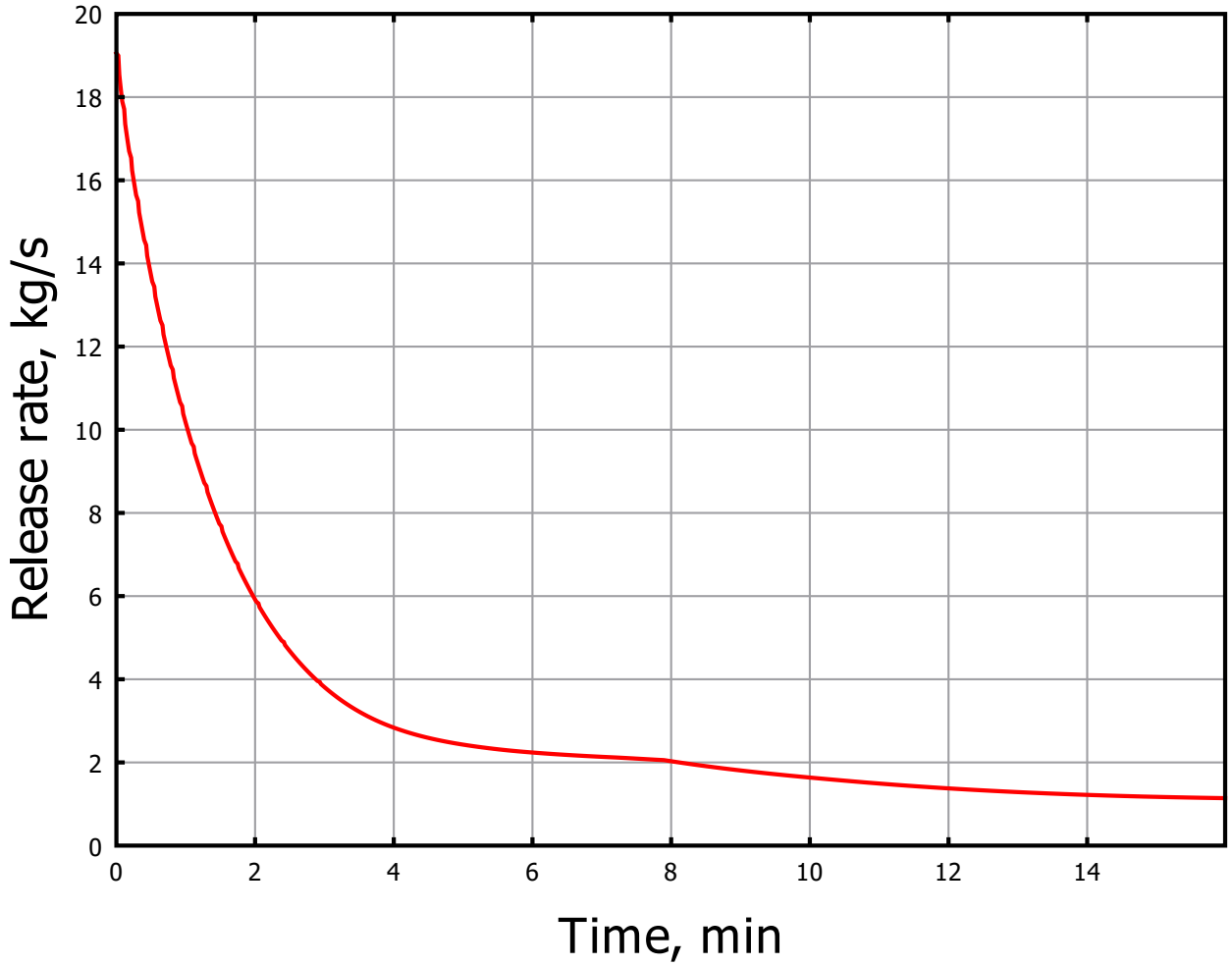

Figure 9: Maximum release rate

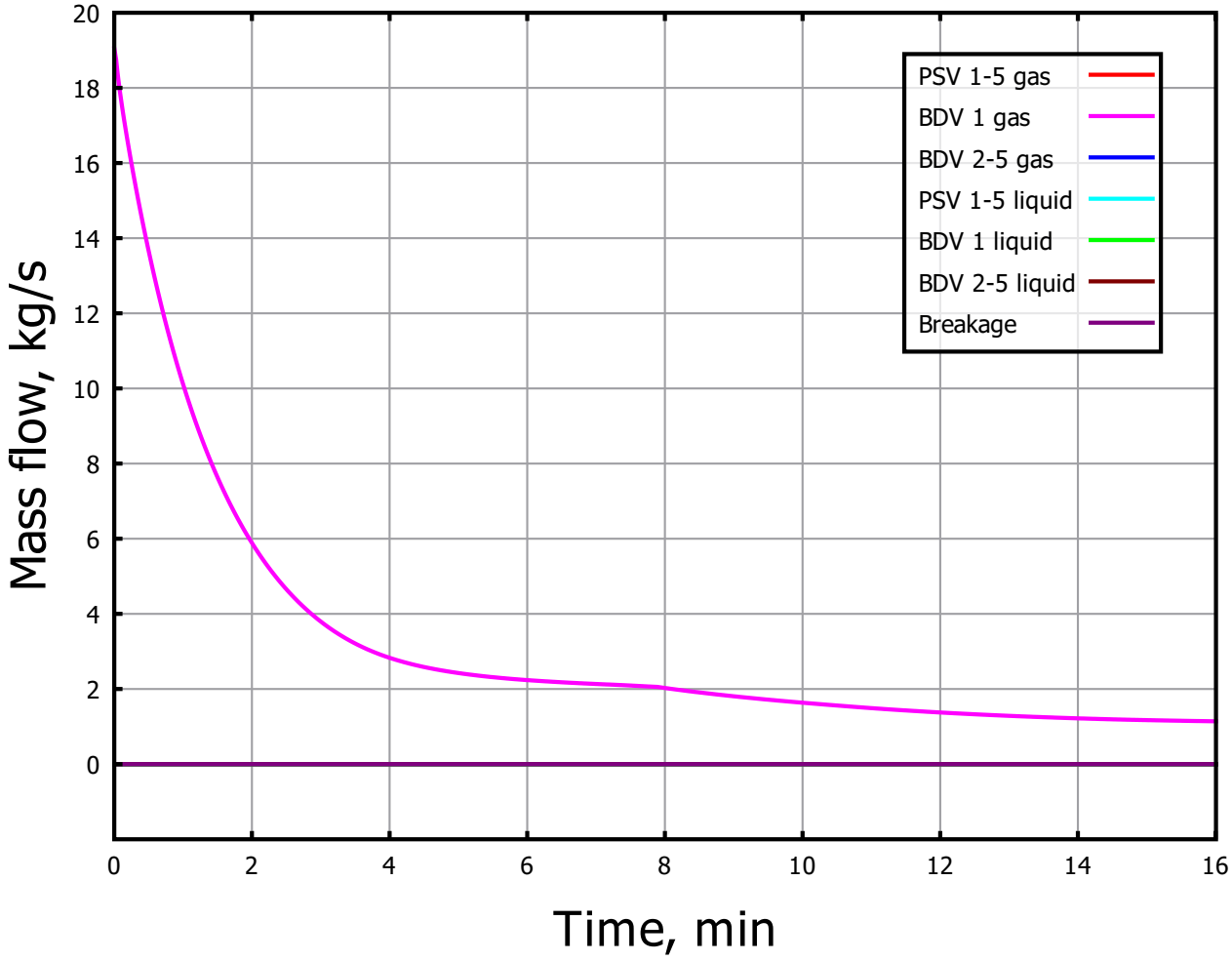

Figure 10: Valve flows

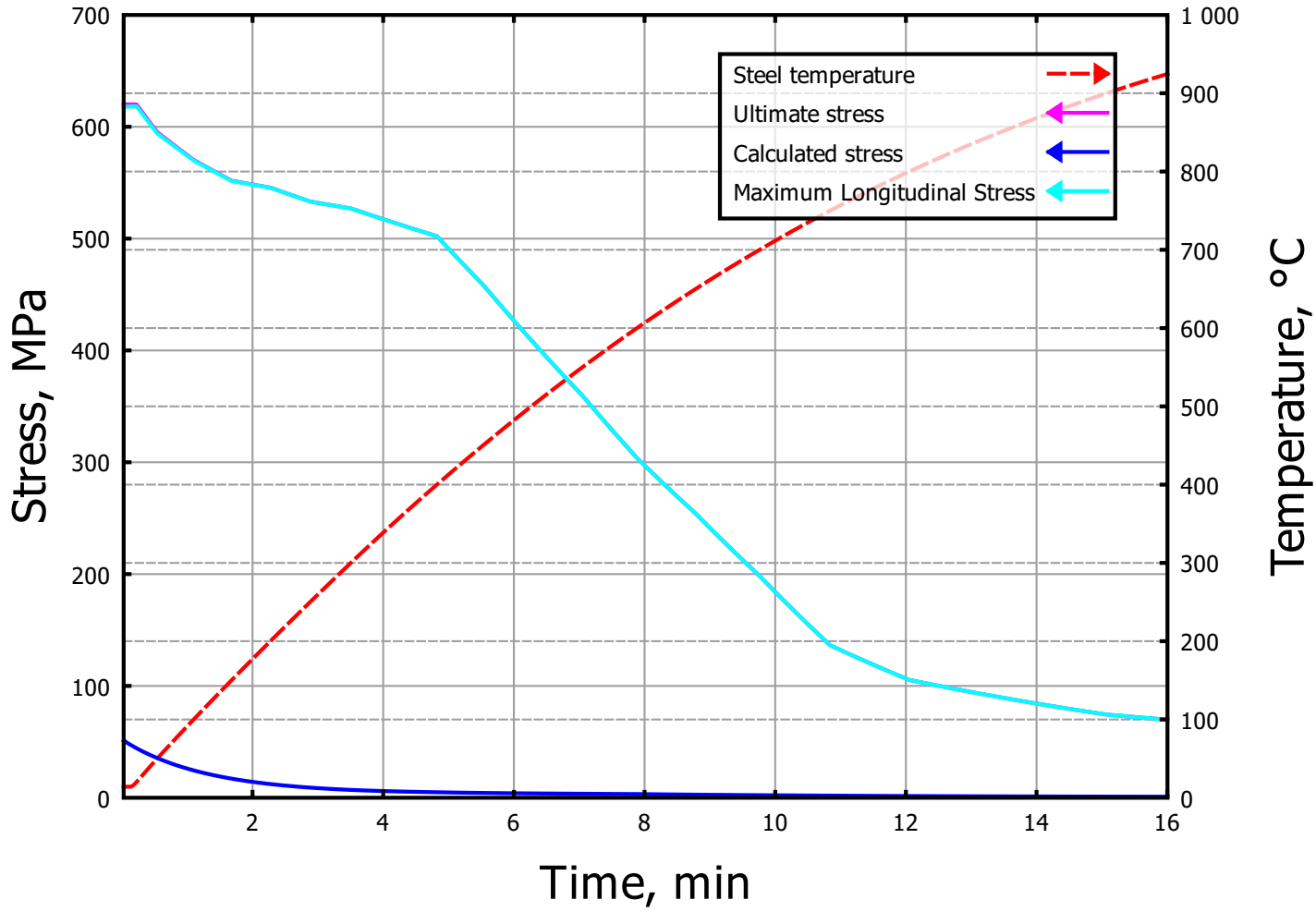

Figure 11: Von Mises, pipe 6-PS-23-062-CS71

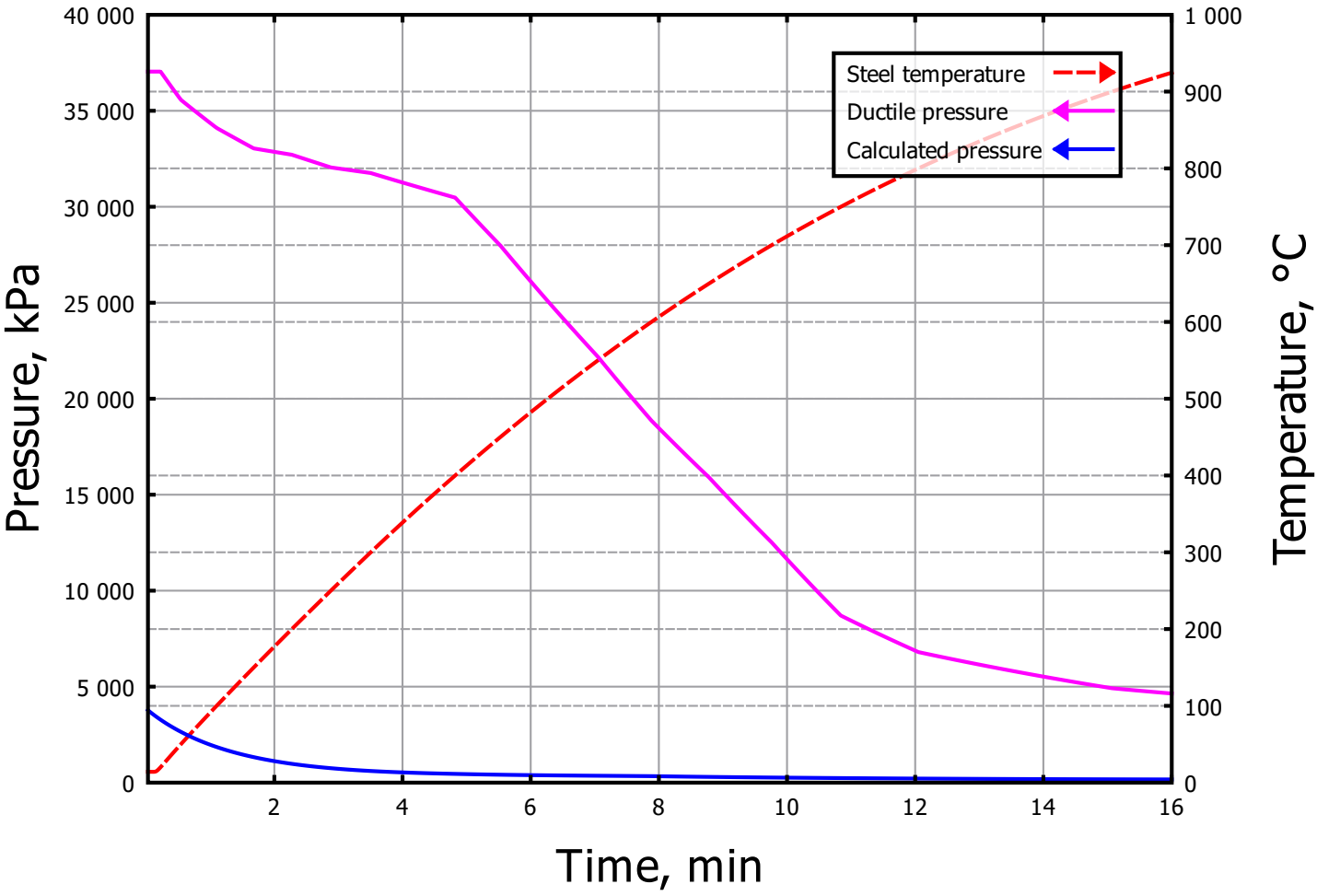

Figure 12: With hardening, pipe 6-PS-23-062-CS71

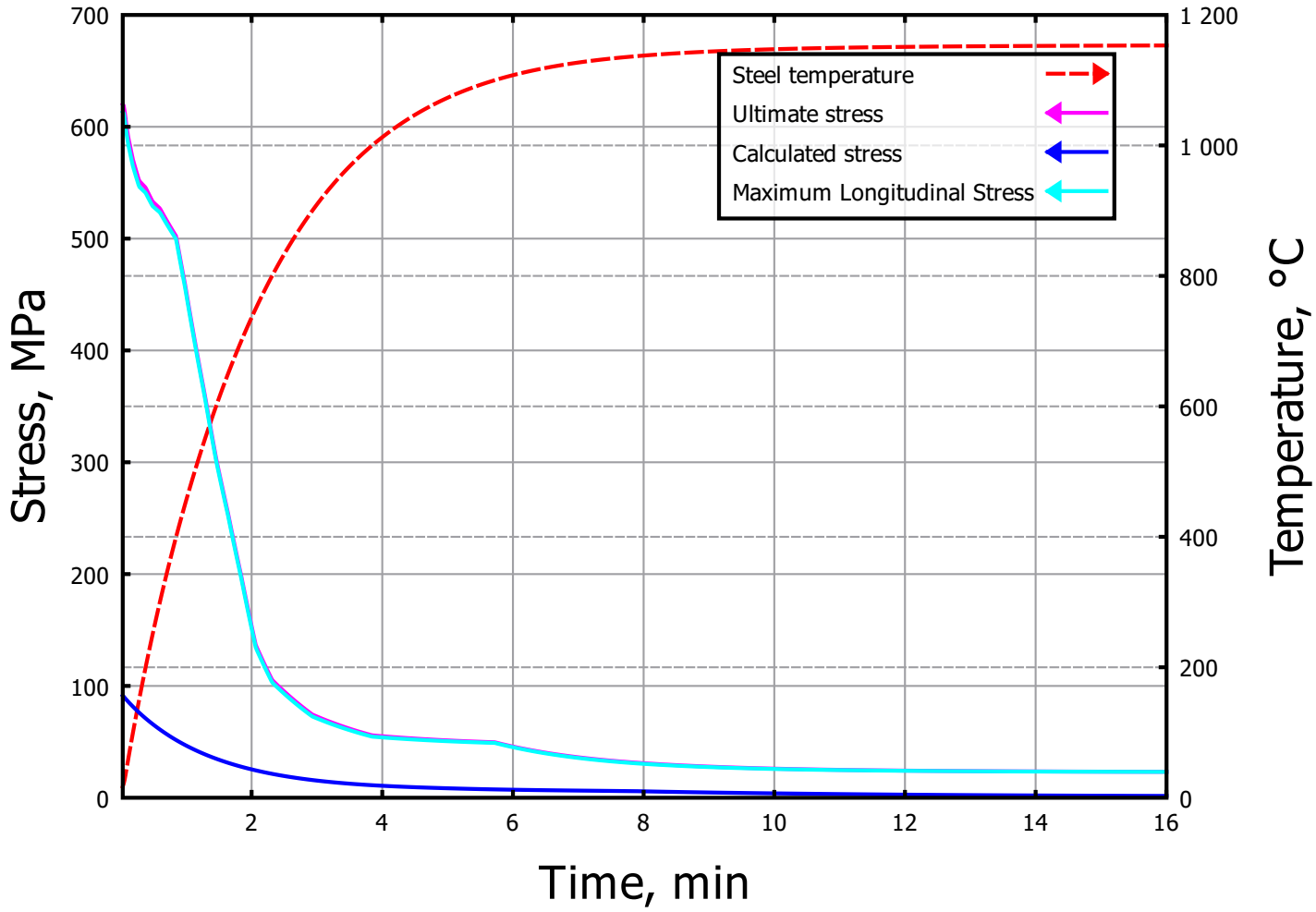

Figure 13: Von Mises, pipe 16-PR-23-101-CS71

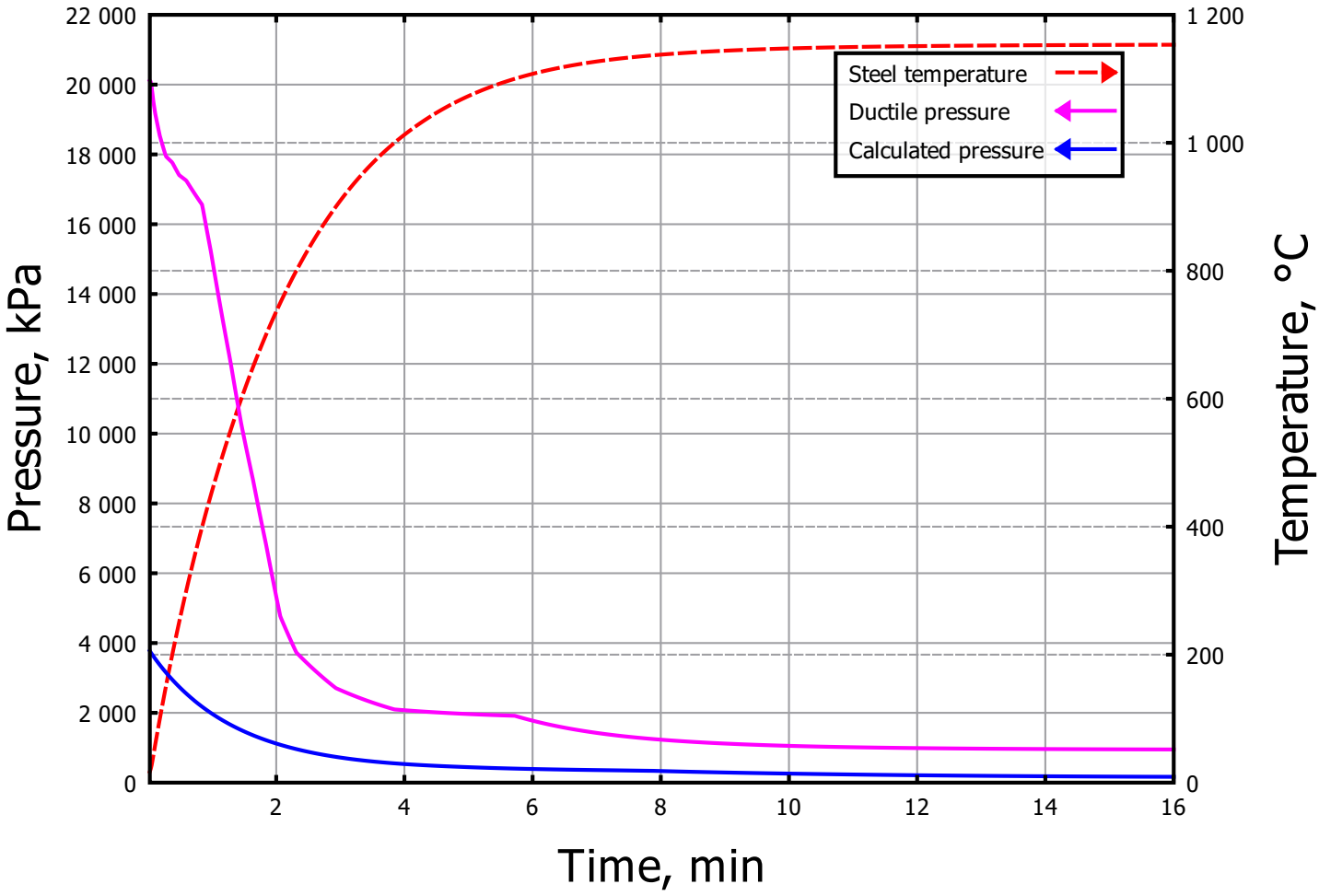

Figure 14: With hardening, pipe 16-PR-23-101-CS71

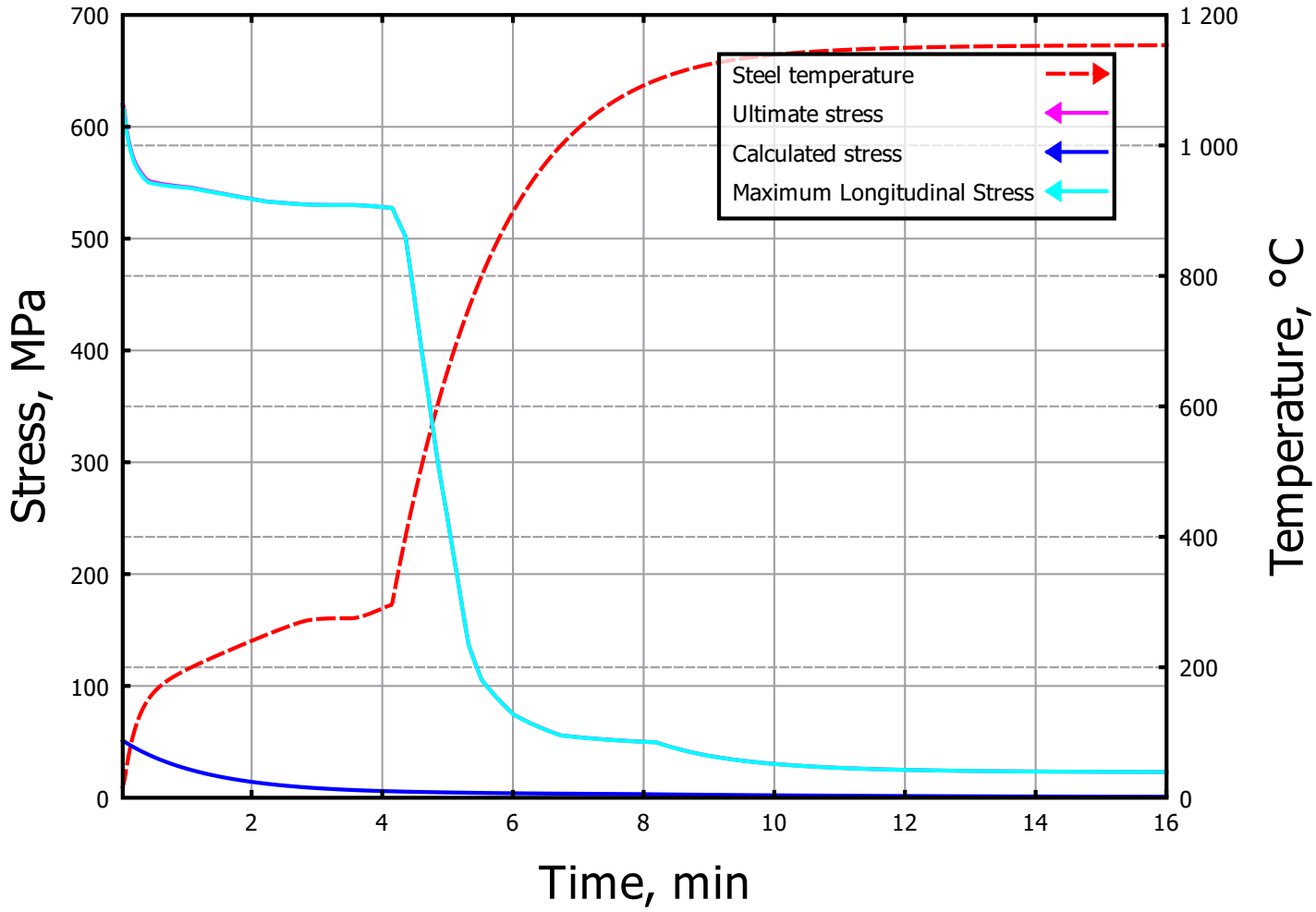

Figure 15: Von Mises, pipe 6-PR-23-154-CS71

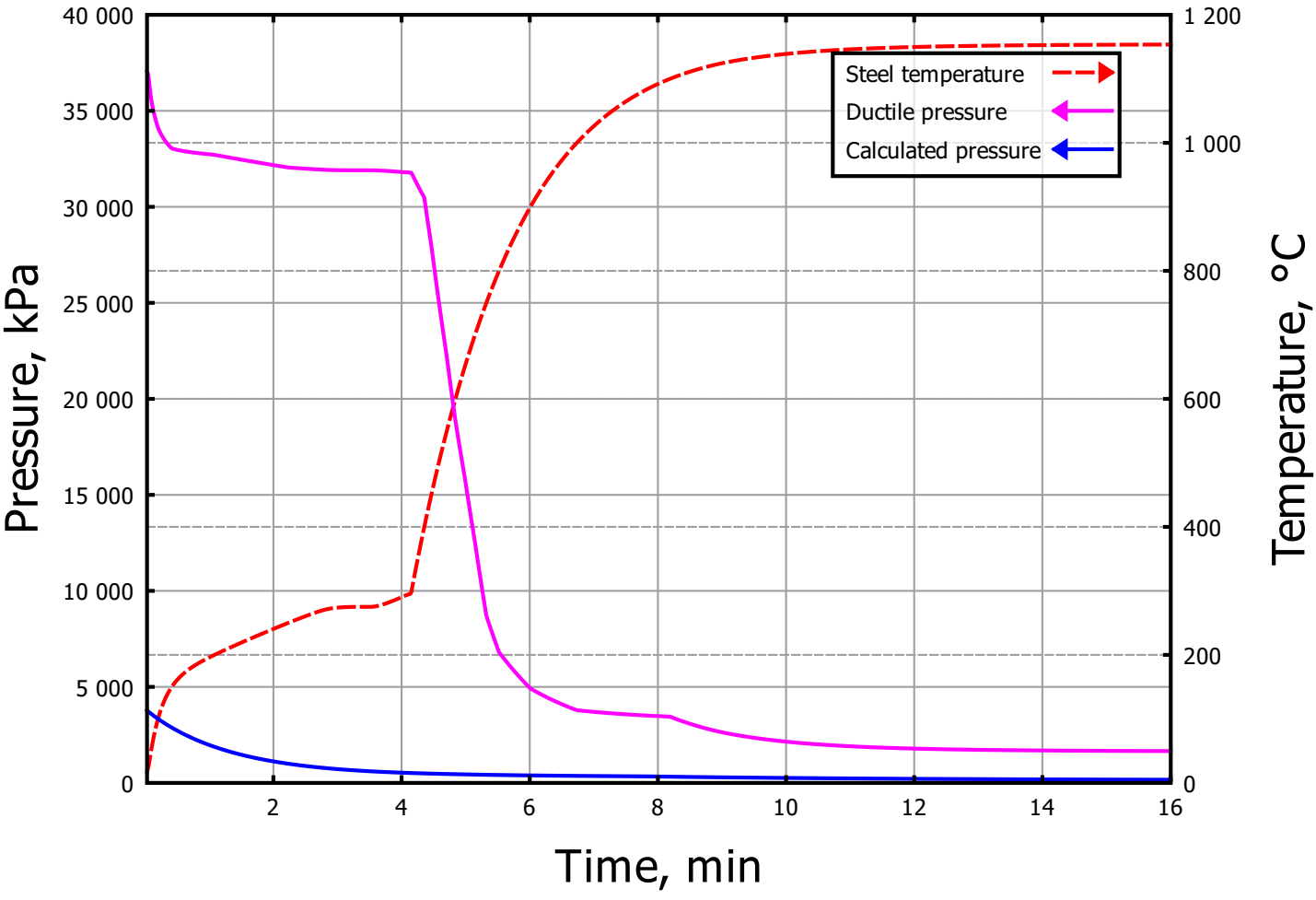

Figure 16: With hardening, pipe 6-PR-23-154-CS71

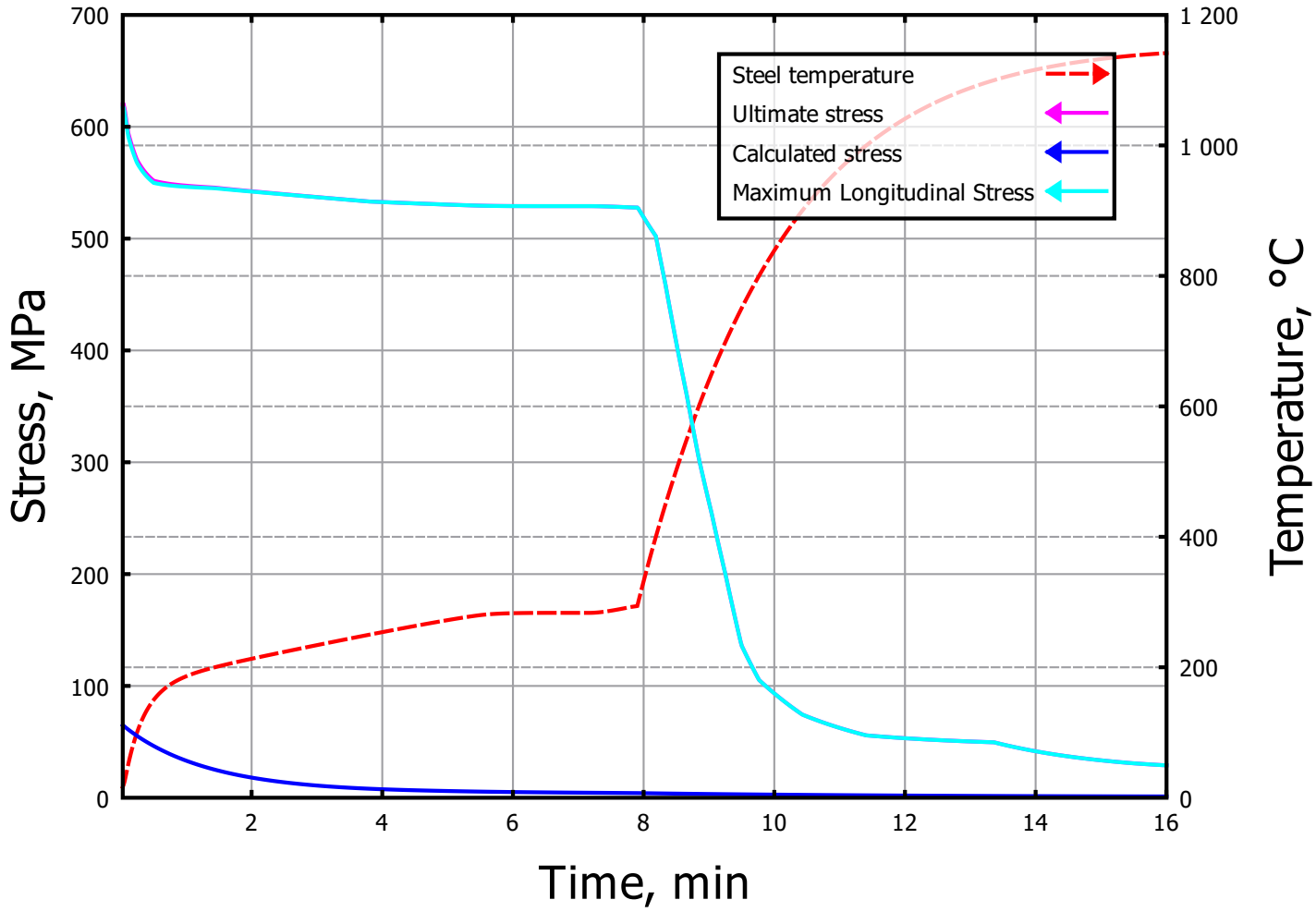

Figure 17: Von Mises, pipe 12-PS-23-051-CS71

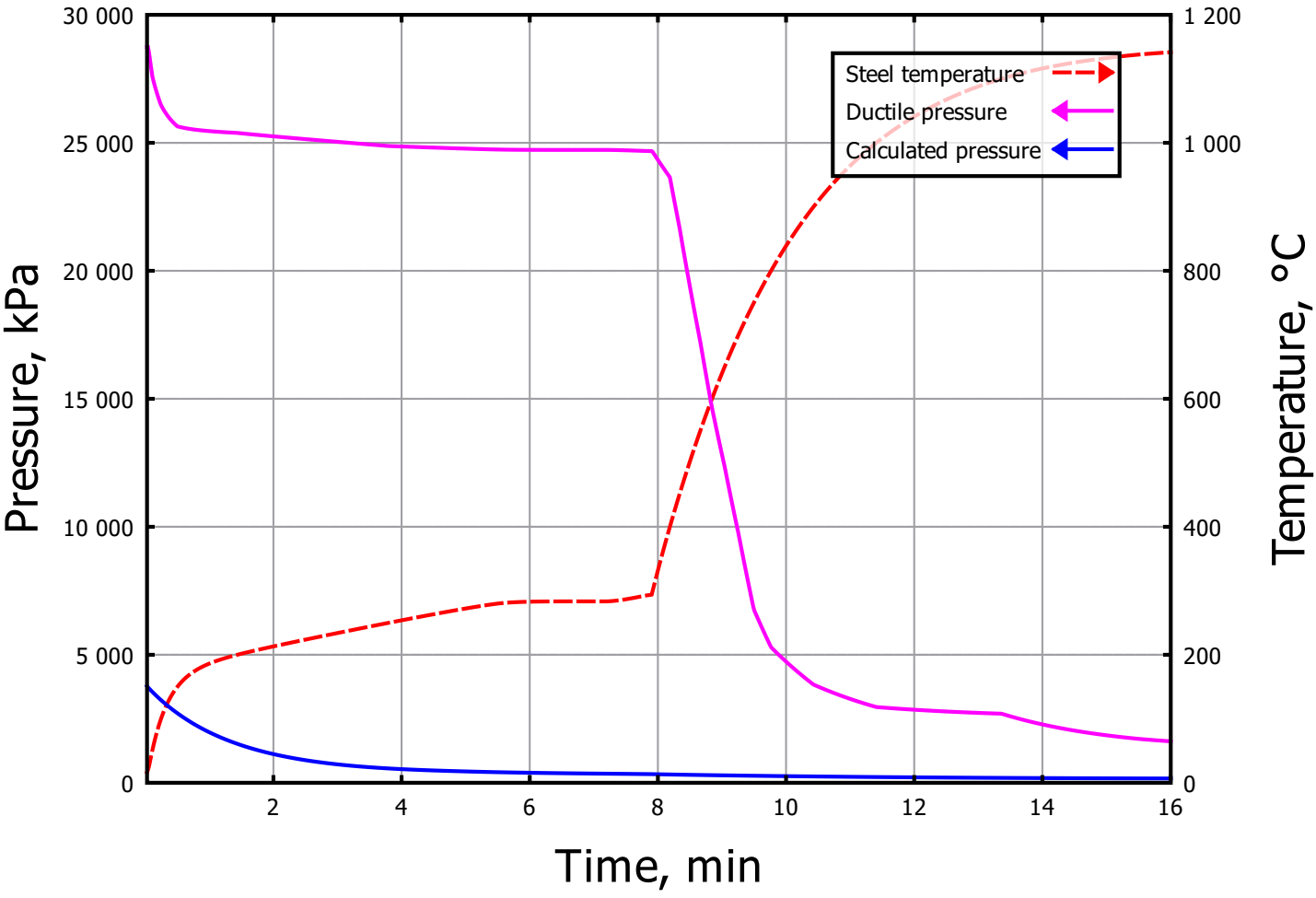

Figure 18: With hardening, pipe 12-PS-23-051-CS71