FrameAI Connection Design Calculation Note

EN 1993-1-8 §6.2.7 Bolted Extended End-Plate Moment Connection
Client: Staalframe Engineering, Ghent BE
Project: Extended 8-bolt 4-row end-plate moment frame
Date: 2024
Designer: C. Mertens

CONNECTION DETAILS
  Beam: HEA 280, S355, L = 8000 mm
  Column: HEA 280, S355
  Bolt arrangement: 8 ×M24, 4-row, grade 10.9
  Bolt category: Class 4 (preloaded) per EN 1993-1-8 Table 3.1
  End-plate: 280 ×400 ×20 mm, S355
  Column web stiffeners: required at tension zone

DESIGN ACTIONS
  M_Ed = 180 kNm (design moment at connection)
  V_Ed = 142 kN (design shear)
  N_Ed = 198 kN (base plate reaction, axial)

BOLT RESISTANCE (EN 1993-1-8 §3.6)
  F_v,Rd = 157 kN per bolt (shear plane, 10.9)
  F_t,Rd = 212 kN per bolt (tension)
  8 bolts ×157 kN = 1,256 kN > V_Ed = 142 kN PASS

END-PLATE BENDING (EN 1993-1-8 §6.2.7)
  Equivalent T-stub: t_p = 20 mm, f_y = 355 N/mm2
  M_Ed / (8 ×z) = 180 kNm / (8 ×0.248 m) = 90.8 kNm/m
  End-plate thickness: 20 mm bending utilisation 81.3% PASS

COLUMN WEB SHEAR (EN 1993-1-8 §6.2.6.2)
  V_Ed = 142 kN, V_Rd = 198 kN 71.7% utilisation PASS

COLUMN WEB STIFFENERS
  Required at tension zone (top flange)
  2 ×PL-150×12 mm, S355, full depth of column

WELD SIZING (EN 1993-1-8 §4.5.3)
  Flange welds: a = 8 mm fillet (16 mm leg)
  Web welds: a = 6 mm fillet

EXECUTION CLASS: EXC 2 per EN 1090-2

Full calculation available in FrameAI app
https://frameai-structural.polsia.app/examples/bolted-moment-connection

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