















directions. Currently anchor loads are calculated separately for each load direction for verification of ultimate limit state (3), (12).

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## 8. References

1. Mahrenholtz, C., "Non-seismic and seismic qualification and design of anchor channels with channel bolts", Joint ASC and AEES Conference, Melbourne, Australia, 2016.
2. Schmidt, T., "Tragverhalten von Ankerschienen unter Querlast in Schienenlängsrichtung", PhD thesis, 2017, Stuttgart, Germany.
3. European Organisation for Technical Assessment, "Technical report: Design of anchor channels. (TR 047)", EOTA, 2018.
4. Mahrenholtz, C., Sharma, A., "Qualification and design of anchor channels with channel bolts according to new EN 1992-4 and ACI 318", Structural Concrete, 2019, 1-13.
5. Konertz, D., Kocur, G.K., et al., "Anchor channels under 3D load interaction – new approaches to load distribution and design", Proc. fib Symposium 2019, Krakow, Poland.
6. Konertz, D., Löschmann, J., et al., "Fiber optic sensing of strain and temperature fields", Bauingenieur, 7/8-2019 [In press].
7. Putke, T., Bohun, R., et al., "Experimental analyses of an optimized shear load transfer in the circumferential joints of concrete segmental linings", Structural Concrete 16, 2016, Ernst & Sohn, pp 572 - 582.
8. Li, L. (2018), "Required Thickness of Flexurally Rigid Baseplate for Anchor Fastenings", High Tech Concrete: Where Technology and Engineering Meet, D.A. Hordijk and M. Luković (Eds.), Springer International Publishing.
9. Bocklenberg, L., Winkler, K., et al., "Low Friction Sliding Planes of Greased PTFE for High Contact Pressures", Open Journal of Civil Engineering, 6, 2016, pp 105-116.
10. Bathe, K.-J., "Finite Elemente Procedures", Prentice-Hall, 1996, New Jersey, USA.
11. Samiec, D., "Distributed fiber-optic temperature and strain measurement with extremely high spatial resolution", Photonik International, 2012, pp 10 - 13.
12. Konertz, D., Mahrenholtz, C., et al., "Ankerschienen unter räumlicher Beanspruchung – Experimente zur Horizontallastinteraktion", In: W. Breit et al. (Eds.): Beiträge zur 5. DAfStb-Jahrestagung mit 58. Forschungskolloquium, Bd. II, Kaiserslautern, 2017, pp 189-200.