

HILTI HANDBOOK FOR STEEL-TO-CONCRETE CONNECTIONS USING POST-INSTALLED SYSTEMS

A comprehensive handbook for understanding the connections from basics to design and installation at site!

1.0 Introduction

Post-installed anchors provide necessary flexibility for modifications, repair, addition of new steel structure to existing concrete structures cast at a previous point in time ensuring the connection is securely established. This technology can be used in a wide range of applications including structural and non-structural connections with simple installation and contribution to sustainable construction practices complying to modern standards. For steel to concrete (S2C) connections, post-installed anchors create reliable, safe and code compliant solution maintaining structural integrity of primary, secondary, temporary structural and non-structural applications.

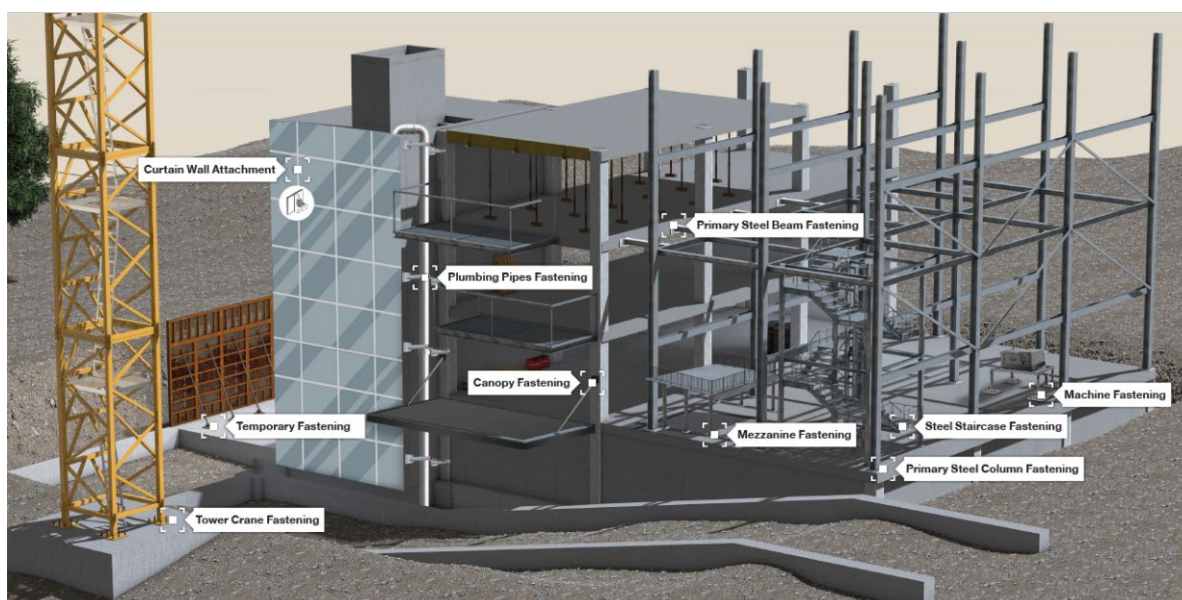


Fig. 1: Typical application in a building under construction

2.0 Highlights from the book

This Handbook aims to provide an overview of working principle, factors influencing performance, qualification and assessment guidelines, design details followed by some examples with calculations, software and tools for design and installation of post-installed anchors. The Handbook is written and presented in a user-friendly and comprehensive way to provide guidance to the engineers involved in designing S2C connections. Furthermore, it is also useful for contractors, in-house technical teams and others who are directly or indirectly associated with such applications.

After a brief introduction, Chapter 2 focuses on the applications, definition of different type of structural and non-structural connections and elements of fastening systems.

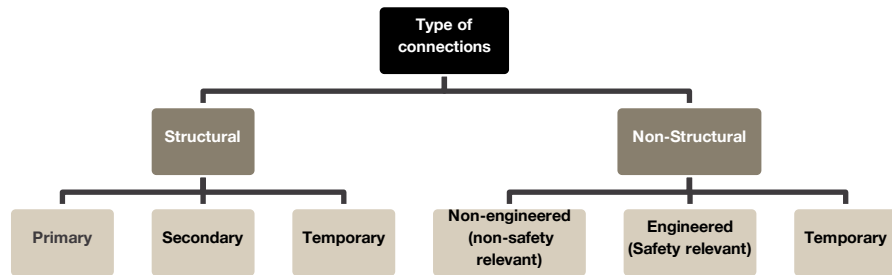


Fig. 2.1: Different types of connections

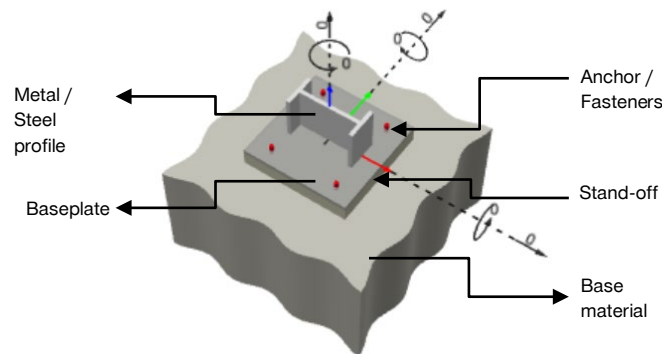


Fig. 2.2: Elements of fastening in steel-to-concrete

Chapter 3 describes the types of post-installed anchors (mechanical, chemical and combined system) along with their working principles, influence of several factors (condition of concrete, environment, installation, loading etc.) on performance of anchors, loading types and directions which anchors can experience during their working life.

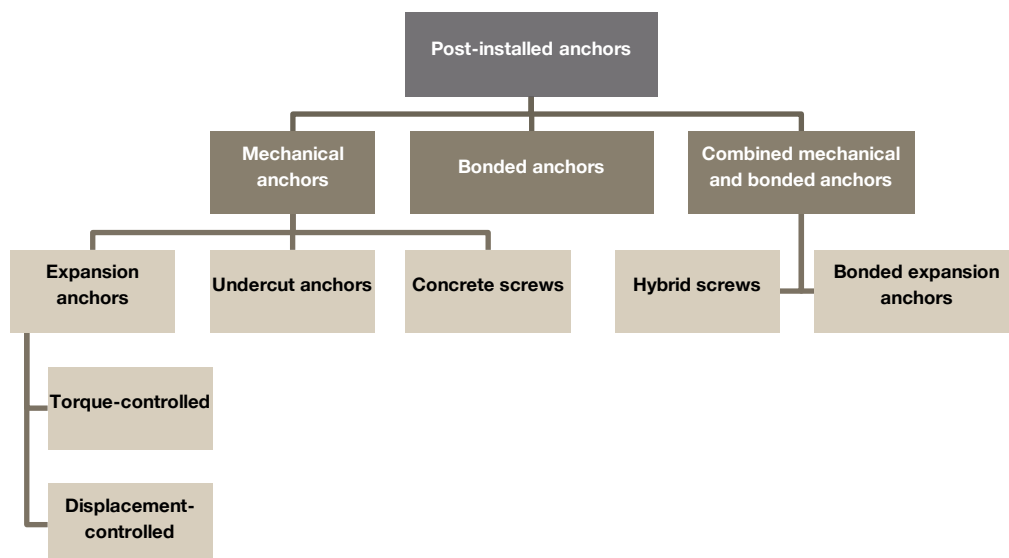


Fig. 2.3: Classification of post-installed anchors

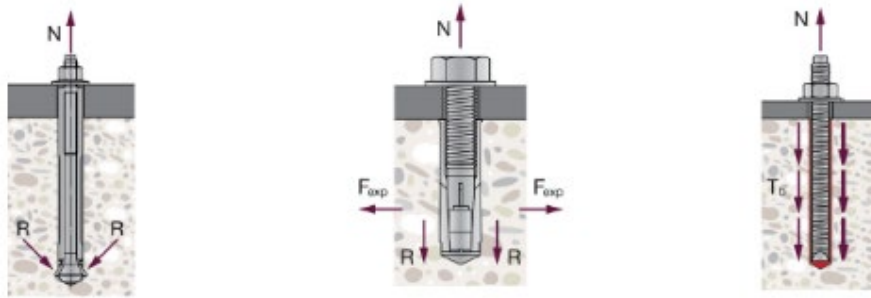


Fig. 2.4: Load bearing mechanism in fastening technology

Chapter 4 talks about the qualification and assessment criteria defined in relevant European Assessment Documents (EADs), design summary in standards including EC2-4, EOTA Technical Reports and product performance mentioned in European Technical Assessments (ETAs).

Table 2.1: Details of design and assessments

	Mechanical	Chemical	Bonded screw
Qualification	Static, Seismic, Fire: EAD 330232 Fatigue: EAD 330250	Static, Seismic, Fire 100 years: EAD 330499 Fatigue: EAD 330250	Static, Seismic: EAD 332795 Fatigue, Fire: Not covered
Design	Static and Seismic: EN 1992-4 Fatigue: EN 1992-4 or EOTA TR 061 Fire: EN 1992-4	Static and Seismic: EN 1992-4 Fatigue: EN 1992-4 or EOTA TR 061 Fire: EN 1992-4 and EOTA TR 082	Static and Seismic: EOTA/TR 075 Fatigue, Fire: Not covered

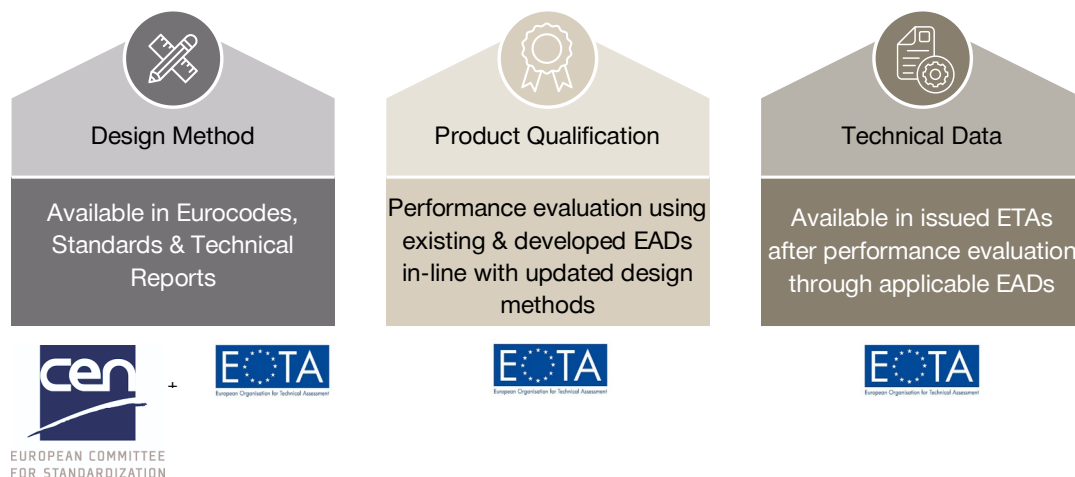


Fig. 2.5: Design and qualification scope briefly defined

Chapter 5 showcases the main Hilti solutions mentioning the key properties and available sizes. It describes the main three phases of construction workflow considering design and installation of anchors as well as their inspection.

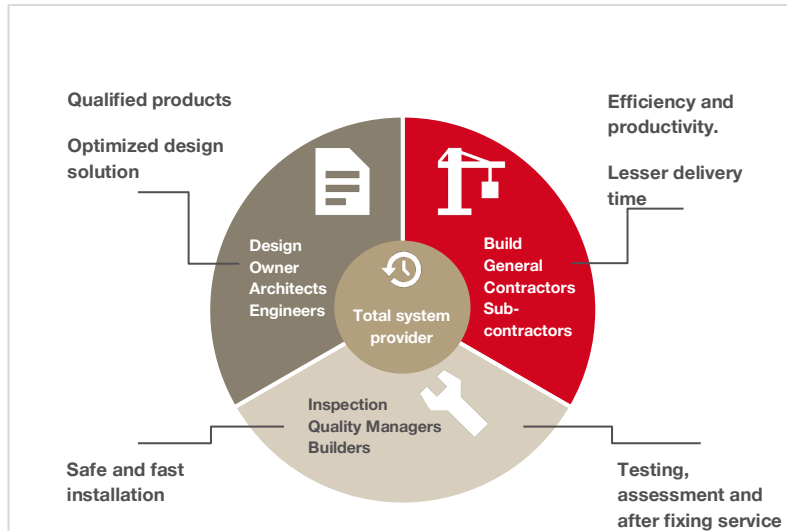


Fig. 2.6: Hilti as total solution provider

Chapter 6 is dedicated for detailed design method, design examples using Hilti latest products against relevant failure modes for different load cases (static / seismic / fire / fatigue) under the scope of EC2-4 and other complementary EOTA TRs.

Ultimate limit state design concept:

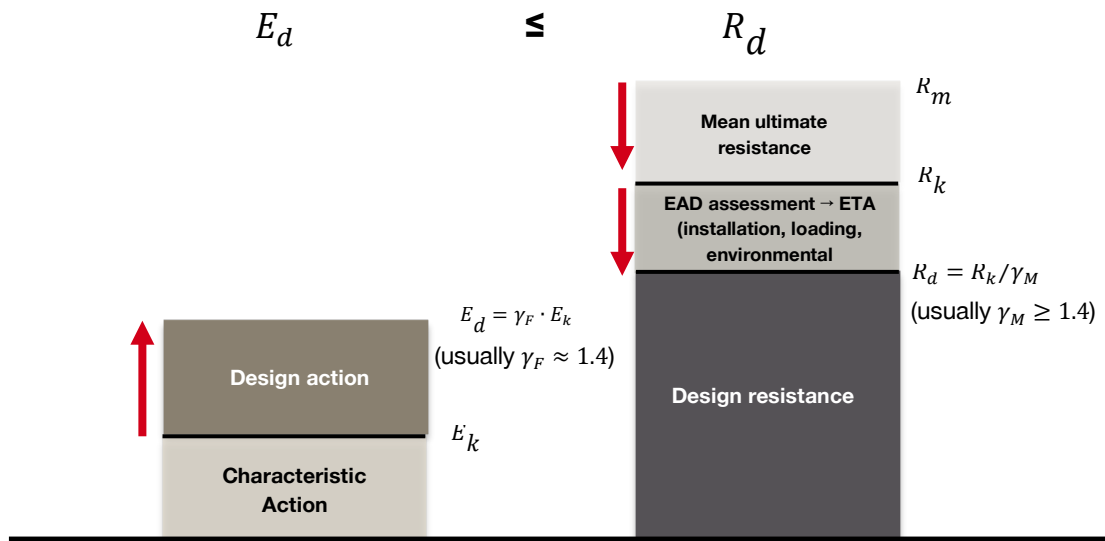


Fig. 2.7: Design concept (amplifying action and lowering down resistance)

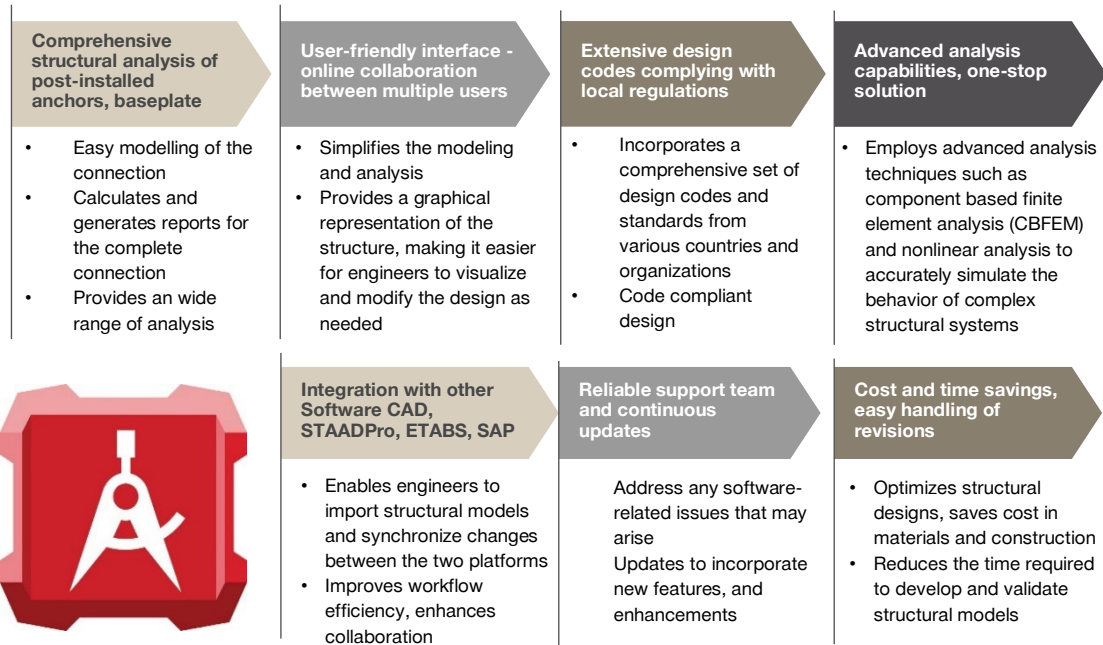


Fig. 2.10: PROFIS, the design software for complete S2C baseplate and anchorage applications

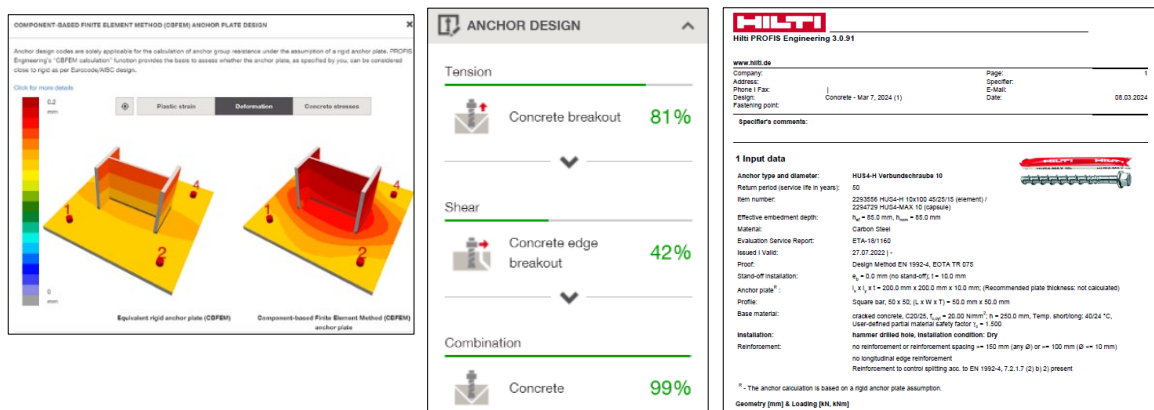


Fig. 2.11: CBFEM analysis and sample design report in PROFIS

Chapter 8 describes all relevant steps of installation process, use of proper tools, technologies (SPEC2SITE), jobsite services, inspection, onsite testing and quality control process offered by Hilti.

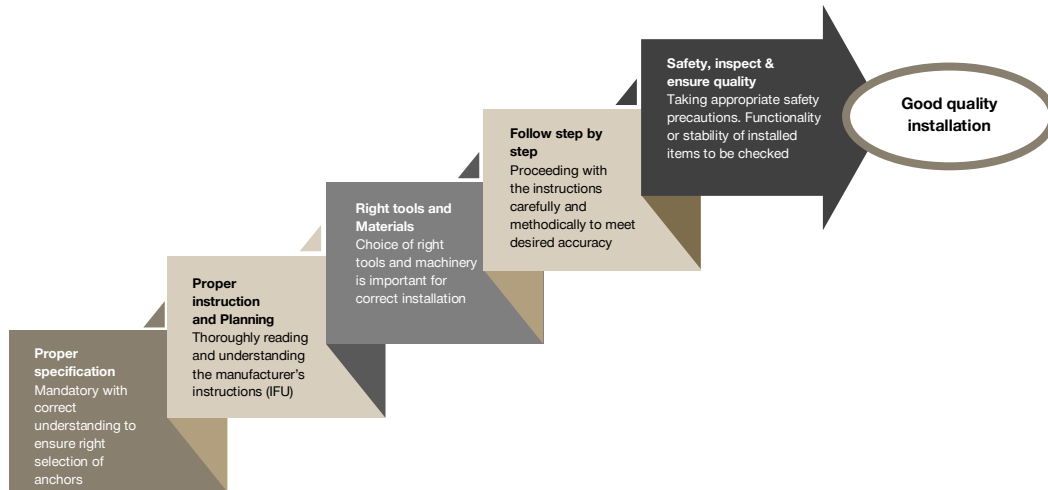


Fig. 2.12: Steps for proper installation



Fig. 2.13: Use of latest tools, jobsite services, spec2SITE

Chapter 9 presents some worldwide projects of S2C applications with highlights on the support and end-to-end solutions provided by Hilti.



Fig. 2.14: Reference projects highlights

3.0 To know more details

Click here to download the S2C Handbook: [Please add link from respective HOL](#).

References

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