

DESIGN AND MAINTENANCE OF TORRENTIAL BARRIERS

THE AUSTRIAN STANDARD RULES SERIES “ONR 24800”

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INTRODUCTION

Due to the high proportion of Alpine regions of the Austrian federal territory, there is a high exigency to protect human settlements against torrential hazards. Because of the high influence of these processes on the human living space there is a long tradition in torrent control works in the Austrian Alps which has brought about a huge stock of protection structures, leading to numerous different types of protection works on different condition levels in Austrian torrents. In 2006 an interdisciplinary working group (ON-K 256) was established at the Austrian Standards Institute (ASI), which has managed to develop new standards for the load models, design, construction and life cycle assessment of torrent control works (technical standard series ONR 24800). The suggested paper will present the standardised requirements for design, construction and maintenance for the most used structure types of torrent control works.

PARTS OF THE ONR 24800 - SERIES

Until 2006 even no official technical standards for the classification, terminology, design, assessment and maintenance of torrential barriers were available in Austria. After the foundation of the working group (ON-AG 256.01) the following standards have been developed:

- *ONR 24800*, Protection works for torrent control - Terms, definitions and classification
- *ONR 24801*, Protection works for torrent control - Actions on structures
- *ONR 24802*, Protection works for torrent control - Design of structures
- *ONR 24803*, Protection works for torrent control - Operation, monitoring, maintenance

By these technical standards the “traditional” assessment and construction concepts for torrent control structures were adapted to the EUROCODE-standards. The working group was able to achieve remarkable progresses. The ONR 24800 and the ONR 24803 are already published. ONR 24802 will be published in January 2011. The ONR 24801 is available as draft and will be finished in 2012. These documents are based on and interact with EN 1990 (basic of structural design), EN 1992-1-1 (design of concrete structures), EN 1997-7 (geotechnical design) and the related documents for the Austrian national specifications.

ONR 24800 - TERMS, DEFINITIONS AND CLASSIFICATION

ONR 24800 contents the terminology and classifications of torrent control including the terms concerning the design and function of torrential barriers. An important classification is the definition of functional barrier types. An Example for the definition of the functional barrier type “dosing and filtering” is shown in Fig. 1. Based on these functional types design and constructional specifications, actions and the maintenance are defined.

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ONR 24801 - ACTIONS ON STRUCTURES

Stresses on torrential barriers result from water (hydrostatic, dynamic), earth and debris flow impacts. In special cases effects from avalanches, falling rocks and earth-quakes must also be considered. The relevant actions, their quantification and load models will be arranged in the ONR 24801.

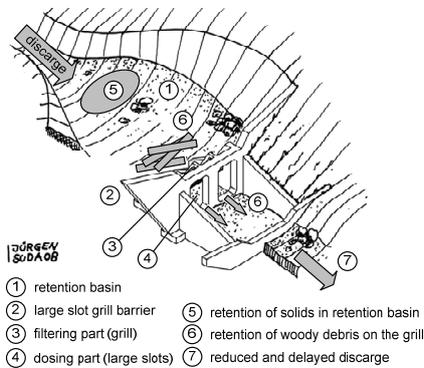


Fig. 1 Schematic view of a large slot grill barrier for dosing and filtering

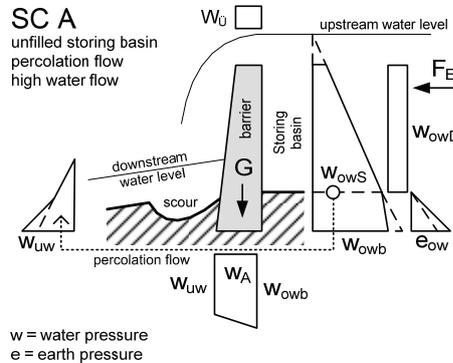


Fig. 2 stress combinations for retention, dosing and filtering barriers; according to ONR 24802

ONR 24802 - DESIGN OF STRUCTURES

For the design of torrential barriers the Ultimate Limit States (ULS) and the Serviceability Limit States (SLS) must be considered. The rules for assessment and design are related to the EUROCODE – standards. The *ONR 24802* is based on this concept and gives specific design rules (e.g. stress combinations) for torrential barriers. An overview is already published in Suda et.al. (2010). An Example for a stress combination for the functional barrier type “dosing and filtering” is shown in Fig. 2.

ONR 24803 - OPERATION, MONITORING, MAINTENANCE

A fundamental task to guarantee a minimum safety level of the protection works is their periodic monitoring concerning their condition and effectiveness. The monitoring concept, in the *ONR 24803*, is divided in two parts, the inspection and the measurement or intervention part. More details to this topic are published in Suda et.al. (2008).

CONCLUSIONS

After completion of the ONR - series the first official comprehensive technical standard for design and maintenance of torrent protection works will be available. The highest uncertainty in attaining adequate design and assessment of these barriers is on the actions side. Due to this fact, specific design rules are very important to get robust barriers which are able to fulfil their function over the expected lifetime. It is also very important to support these barriers during their lifetime with a suitable monitoring and maintenance concept.

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