

Accepted Manuscript

On the structural anisotropy of physical and mechanical properties of a Bunter Sandstone

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PII: S0191-8141(17)30315-2

DOI: [10.1016/j.jsg.2018.06.010](https://doi.org/10.1016/j.jsg.2018.06.010)

Reference: SG 3681

To appear in: *Journal of Structural Geology*

Received Date: 24 January 2018

Revised Date: 9 June 2018

Accepted Date: 11 June 2018

Please cite this article as: Menezes, F.F., Lempp, C., On the structural anisotropy of physical and mechanical properties of a Bunter Sandstone, *Journal of Structural Geology* (2018), doi: 10.1016/j.jsg.2018.06.010.

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1 **On the structural anisotropy of physical and mechanical properties of a Bunter**
2 **Sandstone**

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10 Keywords: Anisotropic rocks; Bunter Sandstone; Triaxial testing; Mechanical behaviour;
11 Fracture pattern; Mohr-Coulomb failure criterion

12 Abstract:

13 Studies of structural anisotropy of rocks contribute to the understanding of their mechanical
14 behaviour variation in a broad spectrum of geological settings. In this work we characterise
15 the lithological variation and the mechanical behaviour of the Trendelburg beds, a fine-
16 grained subarkose from the Bunter Sandstone, with moderate effective porosity (10 %) and
17 low permeability (0.5 mD). Traditional triaxial compression tests were carried out with
18 varying confining- and pore pressures in water saturated specimens (7cm diameter x14 cm
19 length). Ultrasonic velocity, permeability, deformability, compressive strength, mechanical
20 work and fracture pattern were determined in two directions of anisotropy (0° and 90°) with
21 respect to bedding. Changing the angle of anisotropy leads to different reactions to the
22 influence of lithological heterogeneities, which reaches a maximum when arranged parallel to
23 σ_1 . The Trendelburg beds has significant anisotropy effects, which tend to increase with
24 effective pressure. The effects of a structural anisotropy due to bedding are associated with an

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