7
Referências bibliográficas

AMERICAN SOCIETY FOR TESTING AND MATERIALS. ASTM D 2664: **Standard test method for triaxial compressive strength of undrained rock core specimens without pore pressure measurements.** 2004.

AMERICAN SOCIETY FOR TESTING AND MATERIALS. ASTM D 4543: **Standard practices for preparing rock core as cylindrical test specimens and verifying conformance to dimensional and shape tolerances**. 2007.

BIENIAWSKI, Z.T.; VAN HEERDEN, W.L. The significance of in situ tests on large rock specimens. **International Journal of Rock Mechanics and Mining Sciences**, v.12, n. 4, p. 101-113, abr. 1975.

BIENIAWSKI, Z.T. In situ strength and deformation characteristics of coal. **Engineering Geology**, v.2, n.5, 9, p. 325-340, ago. 1968.

BIENIAWSKI, Z.T The effect of specimen size on compressive strength of coal. **International Journal of Rock Mechanics and Mining Sciences**, v.5, n.4, p.325-335, jul. 1968.

BUSTIN, M; CAMERON, A.; GRIEVE, D.; KALKREUTH, W. **Coal Petrology Its principles, methods and applications**. Victoria, British Columbia: Geol. Association of Canada. Notas de curso livre, v. 3, 3 ed., 1989.

BUTLAND, C. **Coal seam gas association in the huntly.** Ohay e Greymouth Regions, New Zeland, 2006. Dissertação (mestrado) – Department of geological sciences, University of Canterbury.

CENTRO DE EXCELÊNCIA E PESQUISA SOBRE ARMAZENAMENTO GEOLÓGICO DE CARBONO - CEPAC -. Dimensão Ambiental. In: **Relatório Social 2009 PUCRS**. Disponível em: <http://www.pucrs.br/edipucrs/relatoriosocial2009/arquivos/ambiental.pdf>. Acesso em 17 ago. 2009.

CHALMERS, G.R.L.; BUSTIN, R.M. On the effects of petrographic composition on coalbed methane sorption. **International Journal of Coal Geology**, v. 69, p. 288-304, 2007.

CODY, G.D. Direct imaging of coal pore space accessible to liquid metal. **Energy and Fuels**, v. 5 p. 776-781, 1991.

CONNEL, L.D.; LU, M.; PAN, Z. An analytical coal permeability model for tri-axial strain and stress conditions. **International Journal of Coal Geology**, v. 84, p. 103-114, 2010.

CORREA DA SILVA, Z.C. The rank evaluation of south Brazilian Gondwana coals on the basis of chemical and physical parameter. **International Journal of Coal Geology**, v. 16, p. 209-210, 1990.

DANIELS, E. J.; ALTENER, S. P. Clay mineral authigenesis in coal and shale from the anthracite region, Pennsylvania**. American Mineralogist**, v.75, p. 825-839, ago. 1990.

DEISMAN, N.; GENTZIS,T.; CHALATURNYK, R.J. Unconventional geomechanical testing on coal for coalbed reservoir well design: The Alberta Foothills and Plains. **International Journal of Coal Geology**, v. 75, p. 15-26, 2008

GALE, J.; FREUND, P. Coal-bed methane enhancement with CO_2 sequestration worlwide potential. **Environmental Geosciences**, v.8, n.3, p. 210-217, set. 2001.

GAMSON, P.; JOHNSON, D.; BEAMISH, B. Coal microstructure and secondary mineralization: their effects on methane recovery**. Geological Society, Special Publications**, v.109, p. 165-179, 1996.

GENTZIS, T.; DEISMAN, N.; CHALATURNYK, R.J. Geomechanical properties and permeability of coals from the Foothills and Mountains regions of western Canada. **International Journal of Coal Geology**, v. 69, p. 153-164, 2006

GONZATTI, C. Proposta para estimativa da resistência à compressão uniaxial in situ de camadas de carvão com a utilização de geofísica. São Carlos (SP), 2007. Tese (Doutorado em Geotecnia) - Escola de Engenharia de São Carlos, Universidade de São Paulo.

GOODMAN, R. E. **Introduction to Rock Mechanics**. 2 ed. New York: John Wiley & Sons, 1989.

GRAY, I. Reservoir engineering in coal seams. Part I**:** The physical process of gas storage and movement in coal seams. **SPE paper**, 12514-PA, v. 2, n.1, p. 28-34, 1987.

GUO, R.; KANTZAS, A. Laboratory investigation on the permeability of coal during primary and enhanced coalbed methane production. **Journal of Canadian Petroleum Technology**, v. 47, p. 27-32, 2008.

HARPALANI, S. Compressibility of coal and its impact on gas production from coalbed reservoirs. **The 37th U. S. Symposium on Rock mechanics** (USRMS), p. 301-308, 1999.

HARPALANI, S.; CHEN, G. Influence of gas production induced volumetric strain on permeability of coal. **Geotechnical and Geological Engineering**, v.15, n.4, p. 303-325, 1999.

HEERMANN, R. et al. Produção de gás (CBM/ECBM/UCG) associado ao armazenamento geológico de CO2 (CCGS) em bacias carboníferas brasileiras. 2009 Disponível em: <http://www.ecoclima.org.br:80>. Acesso em: 14 set 2009.

HOBBS, D.W. The strength and stress-strain characteristics of coal in triaxial compression. **The Journal of Geology**, v. 72, p. 214-231, 1964.

HUY, P.Q. ; SASAKI, K.; Sugai, Y.; ICHIKAWA, S. Carbon dioxide gas permeability of coal core samples and estimation of fracture aperture width. **International Journal of Coal Geology**, v. 83, p. 1-10, 2010.

INTERNATIONAL COMMITTEE FOR COAL PETROLOGY – ICCP. **International Handbook of Coal Petrography.** .2 ed., Paris: Centre National de la Recherche Scientifique, 1963.

INTERNATIONAL COMMITTEE FOR COAL PETROLOGY – ICCP. The new vitrinite classification. **Fuel**, v. 77, p. 349-358, 1998.

JAEGER, J.C.; COOK, N. G. W. Fundamentals of Rock Mechanics. 4 ed. London: Chapman and Hall, 2007.

JIKICH, S.A.; SMITH, D.H. Permeability variation in an upper freeport coal core due to changes in effective stress and sorption. **SPE paper 124348 proceedings of the Annual Technical Conference of Society of Petroleum Engineers**. 1-17, 2009.

KARACAN,C. O.; MITCHEL, G.D. Behavior and effect of different coal microlithotypes during gas transport for carbon dioxide sequestration into coal seams. **International Journal of Coal Geology**, v. 53, p. 201-217, 2003.

KARACAN, C.O.; OKANDAN, E. Fracture/ cleat analysis of coals from Zonguldak Basin (northwestern Turkey) relative to the potential of coalbed methane production. **International Journal of Coal Geology**, v. 44, p. 109-125, 2000.

KARACAN, C.O.; OKANDAN, E. Heterogeneity effects on the storage and production of gas from coal seams. **SPE paper 56551, proceedings of the Annual Technical Conference of Society of Petroleum Engineers**. 479-493, 1999.

KEVIN, E. N.; MICHAEL, W.C.; KATHLEEN, S.F. The relation of diagenetic clays and sulfates to the treatment of coalbed methane reservoirs. **SPE paper 30736, Proceedings of the Annual Technical Conference of Society of Petroleum Engineers.** 363-372, 1995.

KIYAMA, T. et al. Coal swelling strain and permeability change with injecting liquid/supercritical CO2 and N2 at stress-conditions. **International Journal of Geology**, 2010.

LADE, P.V.; KIM, M.K. Single hardening constitutive model for frictional materials – I. Plastic potential function. **Computers and Geomechanics,** v. 5, p 307-324, 1988 a.

LADE, P.V.; KIM, M.K. Single hardening constitutive model for frictional materials – II. Yield criterion and plastic work contours. **Computers and Geomechanics,** v. 6, p 13-29, 1988 b.

LADE, P.V.; KIM, M.K. Single hardening constitutive model for frictional materials – III. Comparisons with experimental data. **Computers and Geomechanics,** v. 6, p 31-47, 1988 c.

LARSEN, W. The effects of dissolved CO2 on coal structure and properties. **International Journal of Coal Geology**, v. 57, p. 63-70, 2004.

LAUBACH, S.E.; MARRETT, R.A.; OLSON, J.E.; SCOTT, A.R. Characteristics and origins of coal cleat: a review. **International Journal of Geology**, v. 35, p. 175-207, 1998.

LEWANDOWSKI, J. H. **Petrologia e geoquímica das camadas de carvão e sua relação com gás natural determinado no poço CBM 001-ST-RS, Bacia do Paraná.** Porto Alegre (RS), 2009. Dissertação (Mestrado em Geociências) - Universidade Federal do Rio Grande do Sul.

LU, M.; CONNELL, L.D. **Swell of coal matrix induced by gas sorption and its partition to pore-volume and bulk strains – A critical parameter for coal permeability.** American Rock Mechanics Association (ARMA), 2010.

MC CULLOCH, C.M.; LAMBERT,S.W.; WHITE, J.R. Determining cleat orientation of deeper coalbeds from overlying coals. **Bureau of Mines Report of Investigations 8116**, p. 1-19, 1976:

MULLER, A. A. et al. **Perfil analítico do carvão.** Textos básicos de geologia e recursos Minerais de Santa Catarina, MME, DNPM, Boletim nº 6, 140. 1987.

PALMER, I.; MANSOORI,J. How permeability depends on stress and pore pressure in coalbeds: a new model. **SPE Reservoir Evaluation & Engineering**, p. 539-544, December, 1998.

RODRIGUES, C.F.; SOUSA, M.J. The measurement of coal porosity with different gases**. International Journal of Coal Geology, v.** 48, p. 245-251, 2002.

SANTOS, E. S. R. **Simulador de meios porosos saturados elastoplásticos.** Campinas (SP), 2009. Tese (Doutorado em Engenharia Civil) - Universidade Estadual de Campinas.

SILVA, M. A. S.; DIAS, A. A. **Geologia Estrutural Programa Levantamentos Geológicos Básicos do Brasil.** Projeto de Mapeamento Geológico/Metalogenético Sistemático. Criciúma, Folha SH.22-X-B, CPRM, p. 31-41, 2000.

SPEARS, D.A.; CASWELL, S.A. Mineral matter in coals: cleat mineral and their origin in some coals from the English Midlands. **International Journal of Coal Geology**, v. 6, p. 107, 1986.

TASKE, K. **An investigation into the pore size distribution of coal using mercury porosimetry and the effect that stress has on this distribution.** Individual Inquiry, 2000. Department of Chemical Engineering, The University of Queensland.

TODA, Y.; TOYODA, S. Micropore structure of coal**. Fuel**, v. 50, p. 187-200, 1972.

TRUEMAN, R.; MEDHURST, T.P. The influence of scale effects on the strength and deformability of coal. In: **ISRM International Symposium on Integral Approach to Applied Rock Mechanics**. Sociedad Chilena de Geotecnia, Santiago, Chile, v.1, p 103-114, 1994.

VELLOSO, R. **Comunicação Pessoal,** 2010

VAN KREVELEN, D.W. **Coal:** Typology, physics chemistry constitution. 3 ed., , Amsterdam: Elsevier, 1993.

VIETE, D. R.; RANJITH, P. G. The effect of CO2 on the geomechanical and permeability behavior of brown coal: implications for coal seam CO2 sequestration. **International Journal of Coal Geology**, v. 66, p. 204-216, 2005.

WEISS, A. L. **Incorporação de dados geomecânicos em projetos de suporte de teto em mina subterrânea de carvão.** Porto Alegre (RS), 2003. Dissertação (Mestrado em Engenharia de Minas Metalúrgica e de Materiais) - Universidade Federal do Rio Grande do Sul.

WHITE, C.M. et al. Sequestration of carbon dioxide in coal with enhanced coalbed methane recovery – a review. **Energy & Fuels**, v. 19, p. 659-724, 2005.

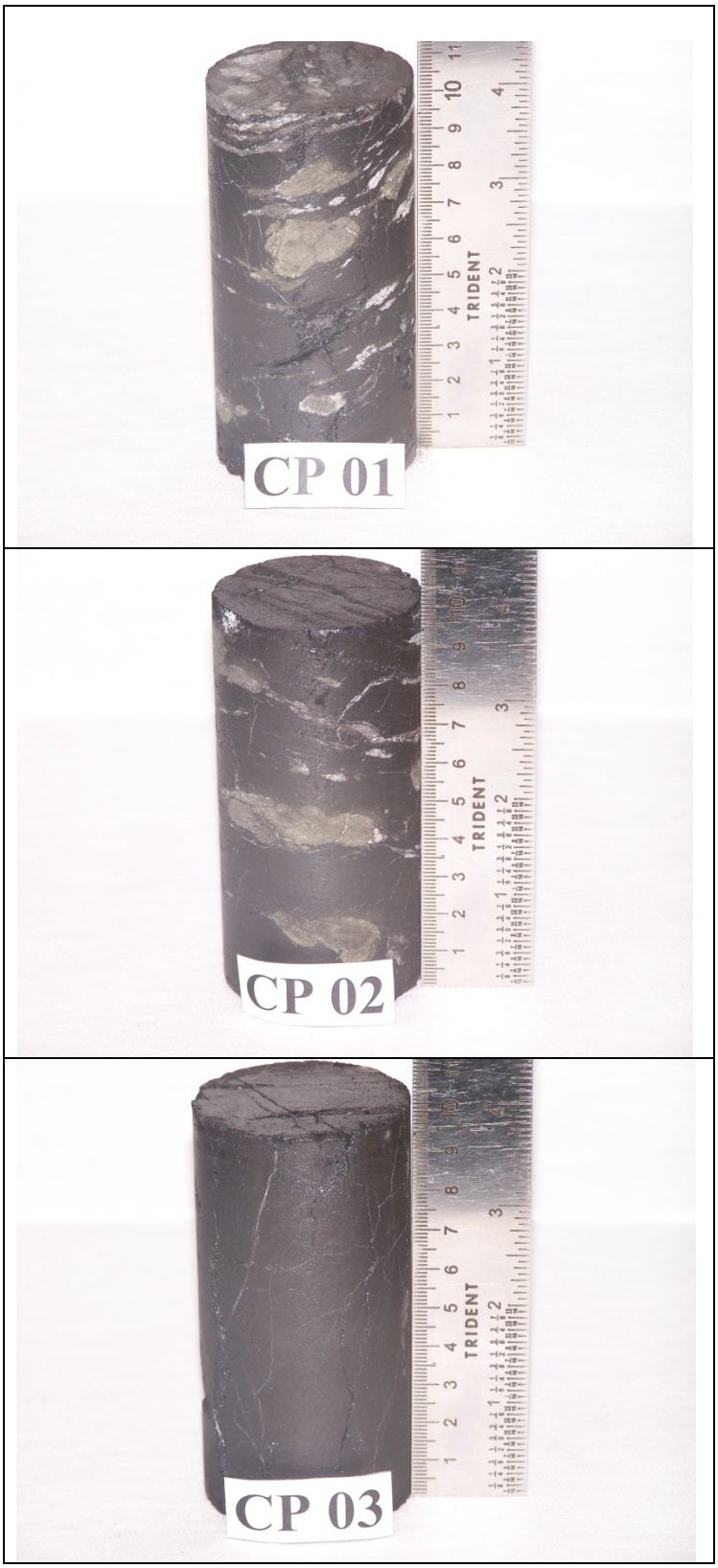
WU, B. The effects of stress path on compressibilities of coal. In: DAEMEN; SCHULTZ (eds.). **Rock Mechanics**. Rotterdam: Balkema, 1995.

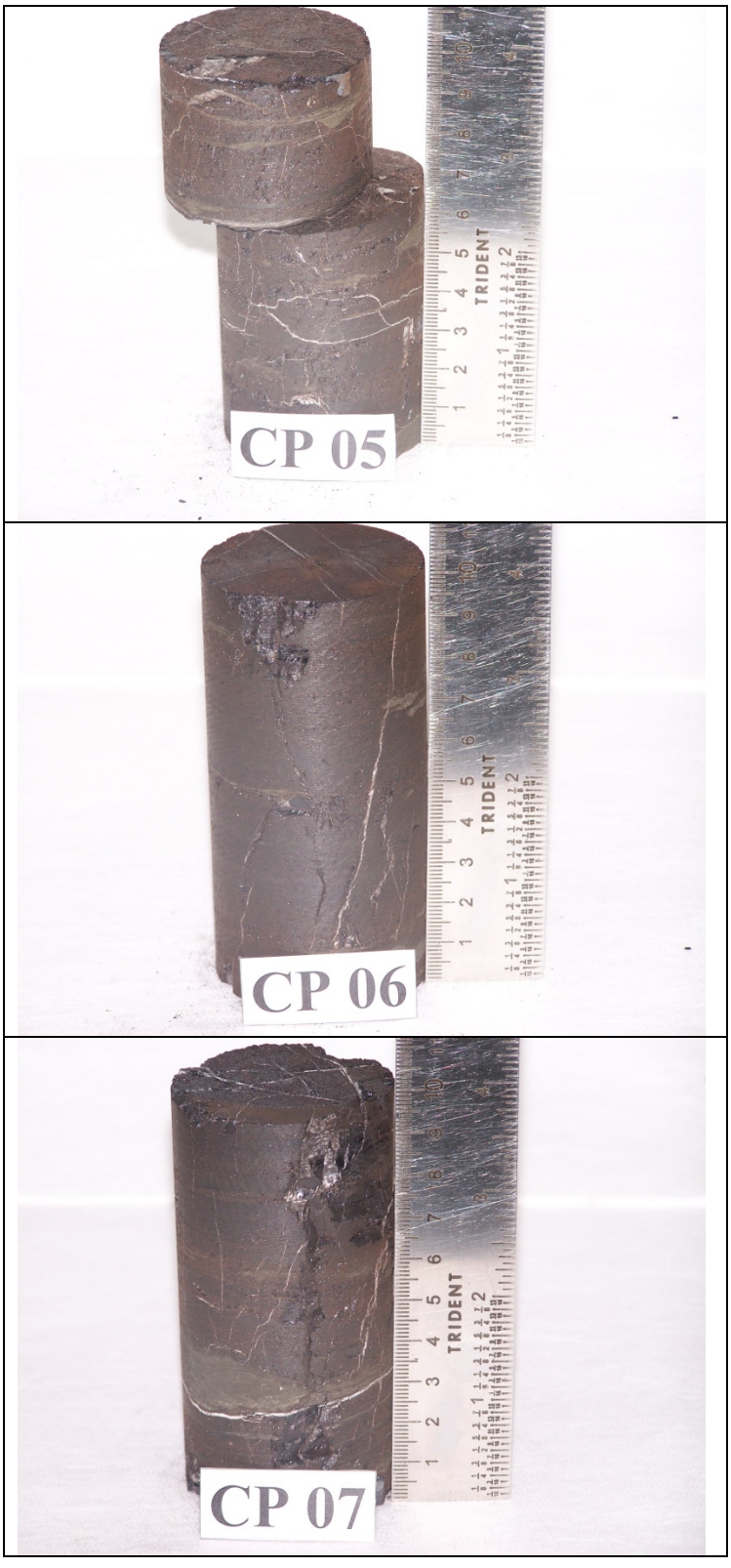
ZINGANO, A. C. **Modelamento geomecânico para dimensionamento de pilares de carvão**. Porto Alegre (RS), 2002. Dissertação (Mestrado em Engenharia de Minas Metalúrgica e de Materiais) - Universidade Federal do Rio Grande do Sul.

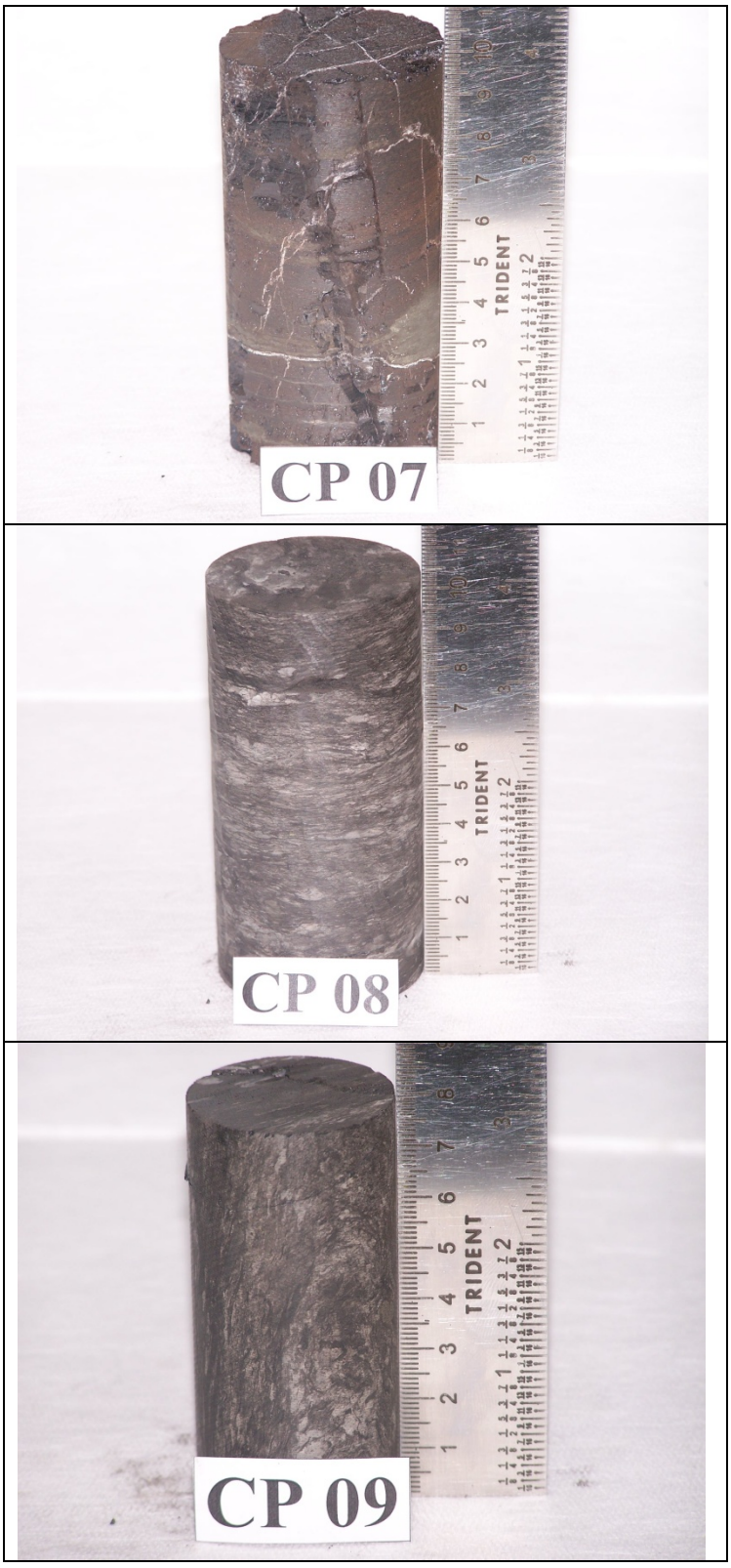
APÊNDICES

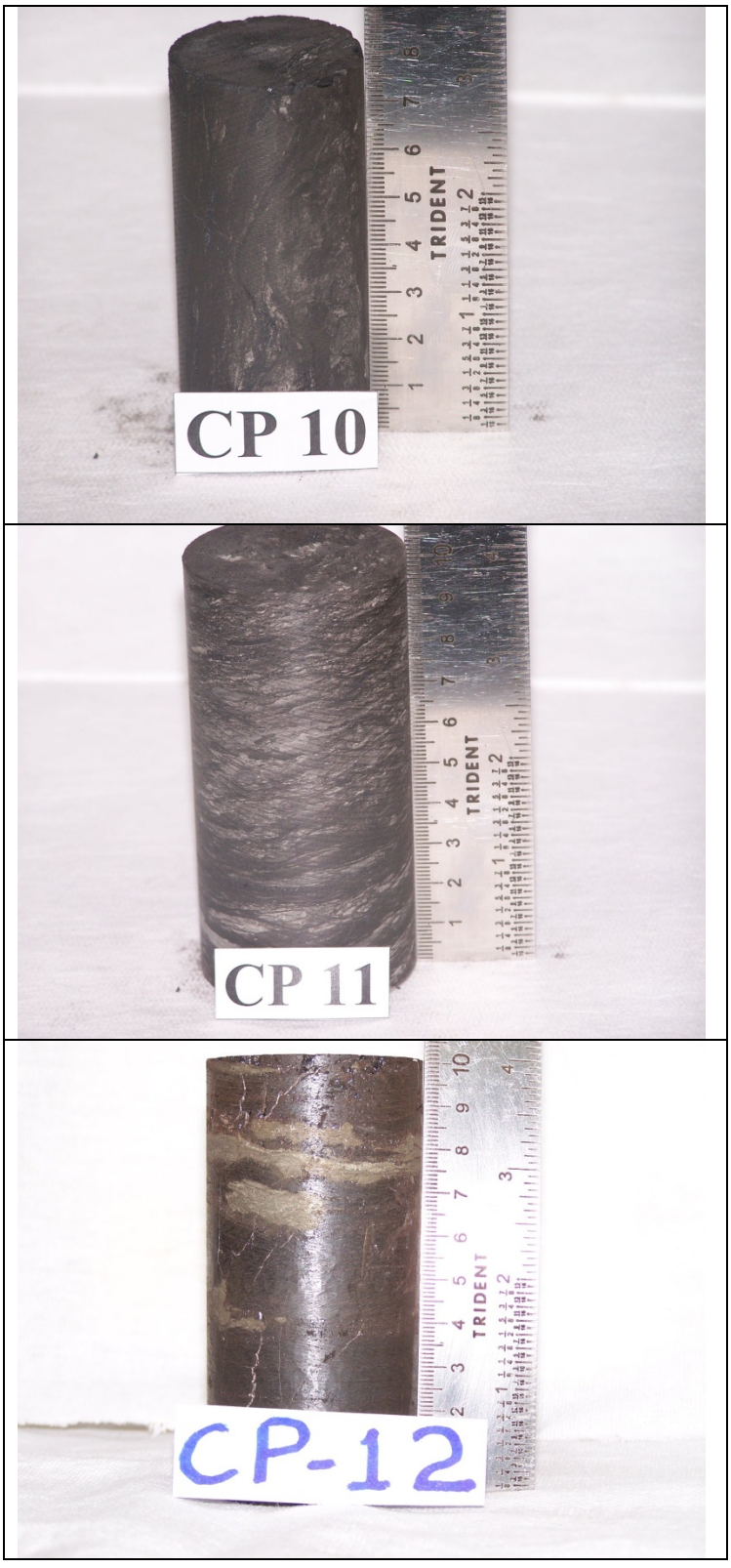
Apêndice A

FOTOS DOS CORPOS DE PROVA





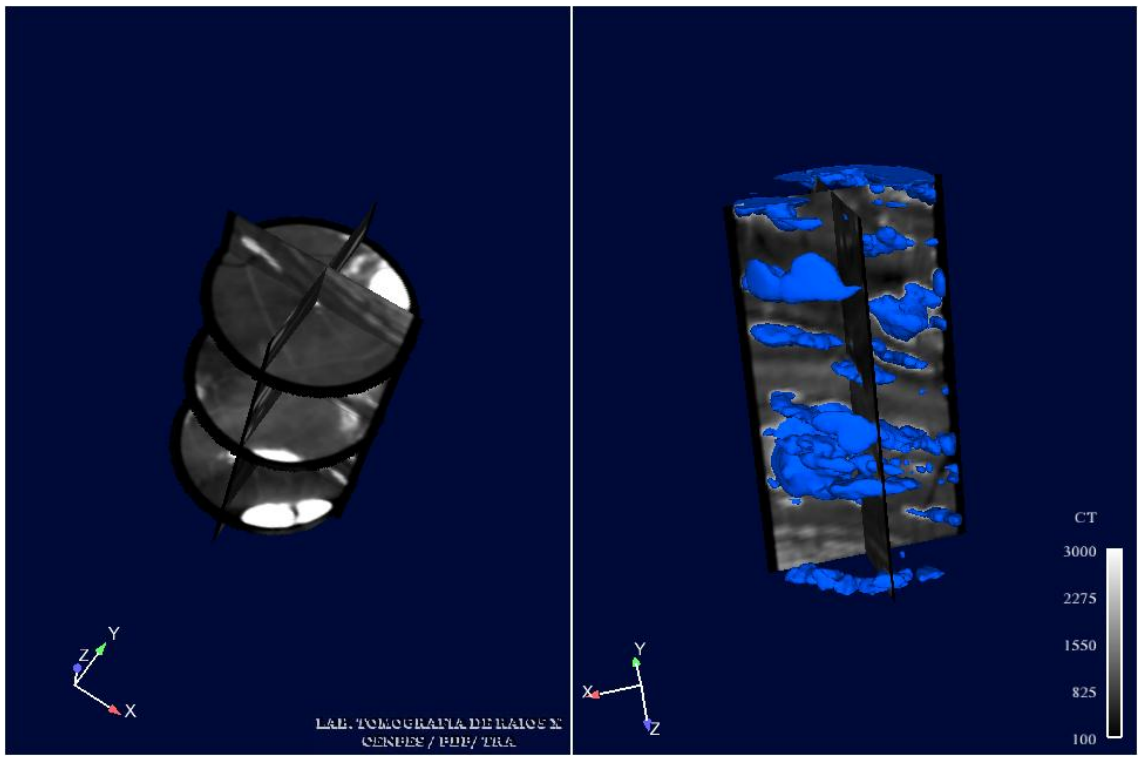




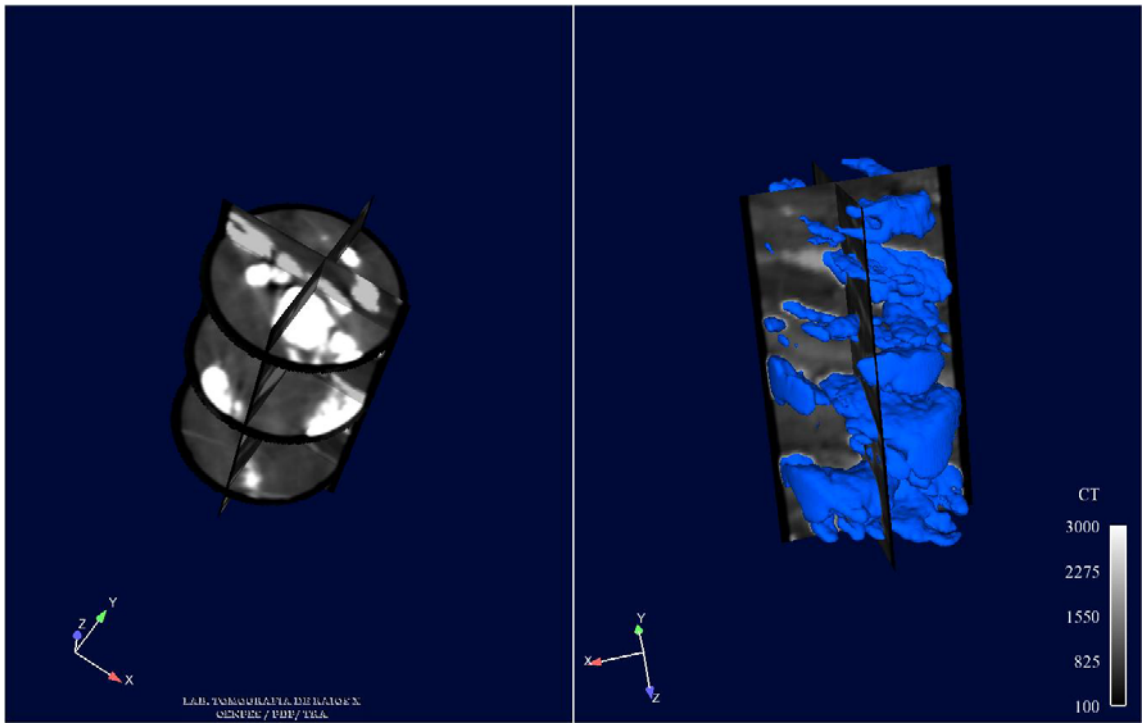
Apêndice B

Tomografia dos Corpos de Prova

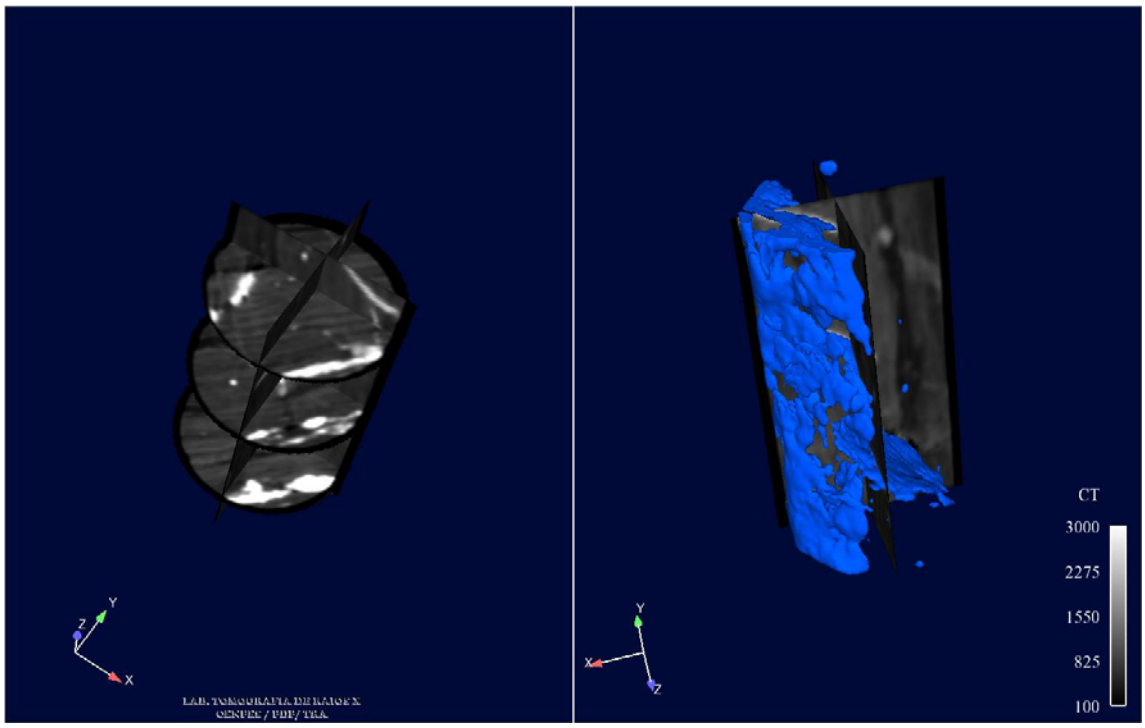
CP 01



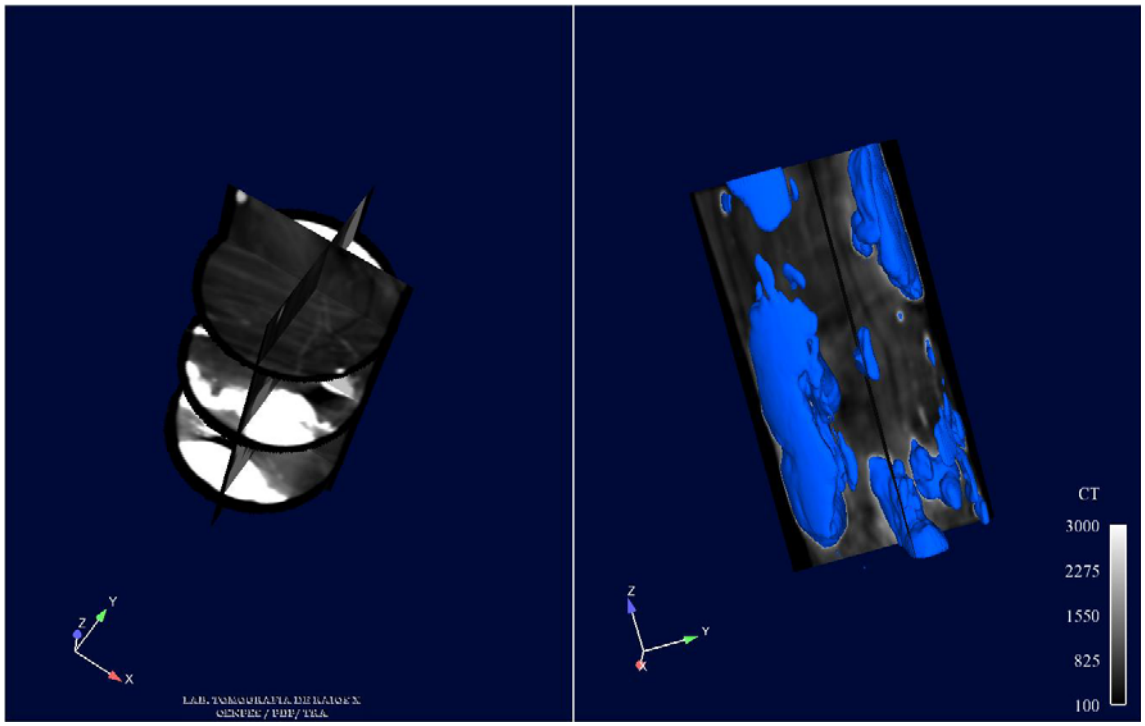
CP 02



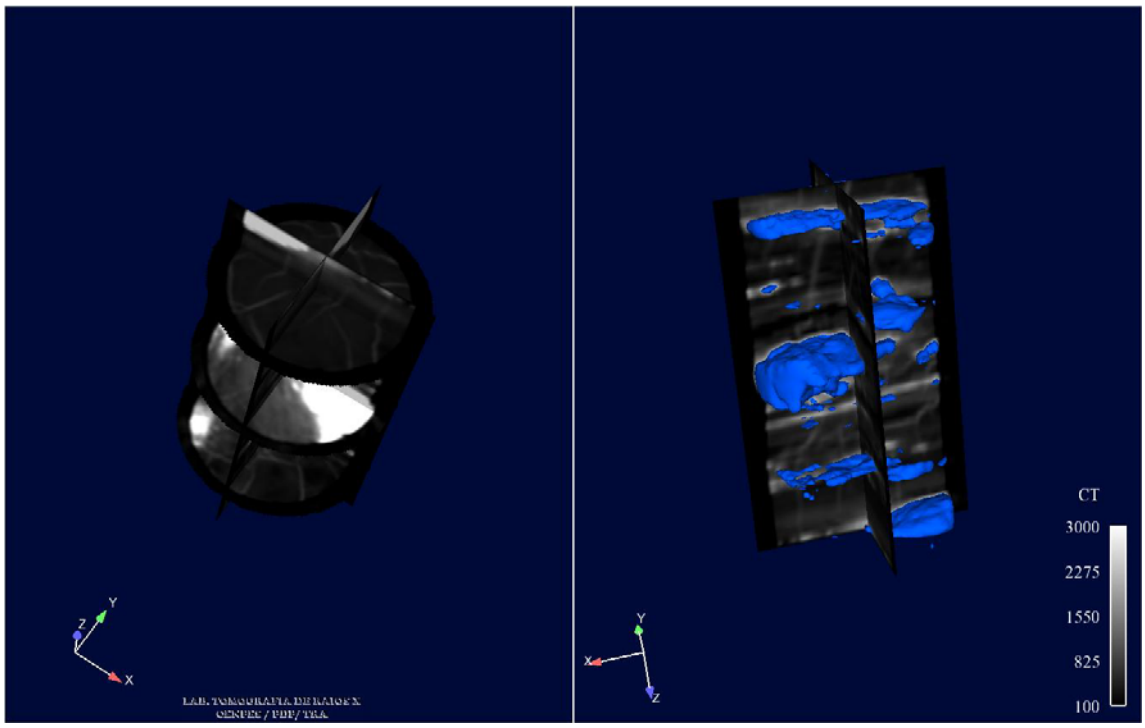
CP 03



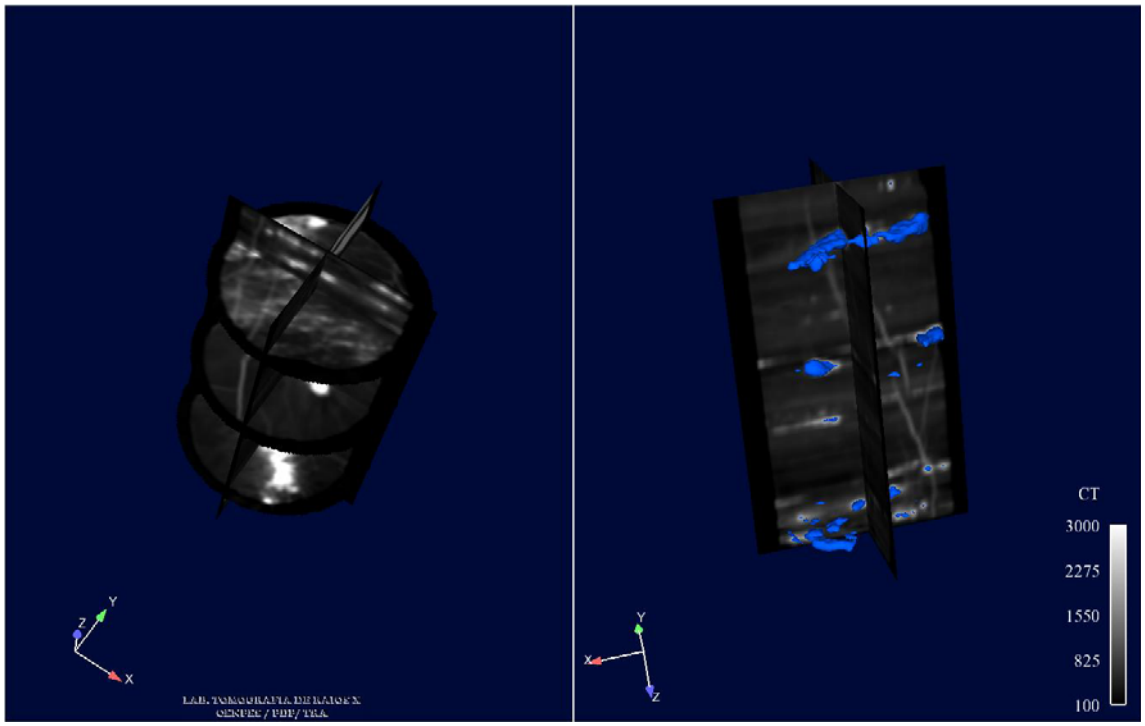
CP 04



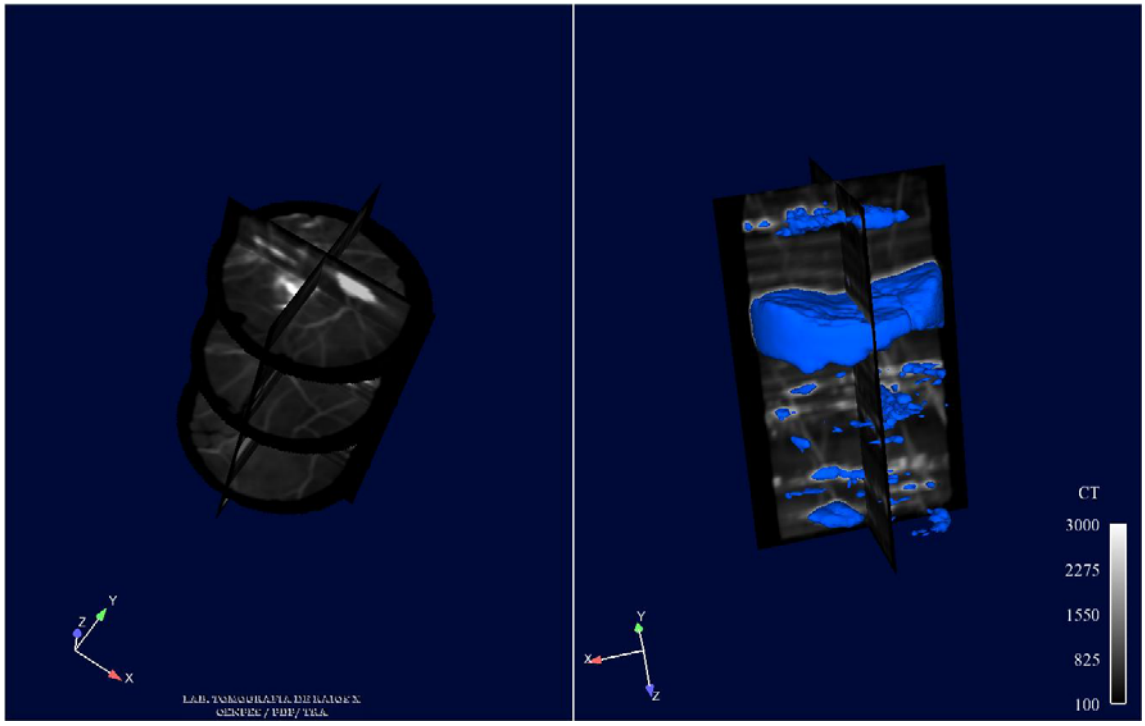
CP 05



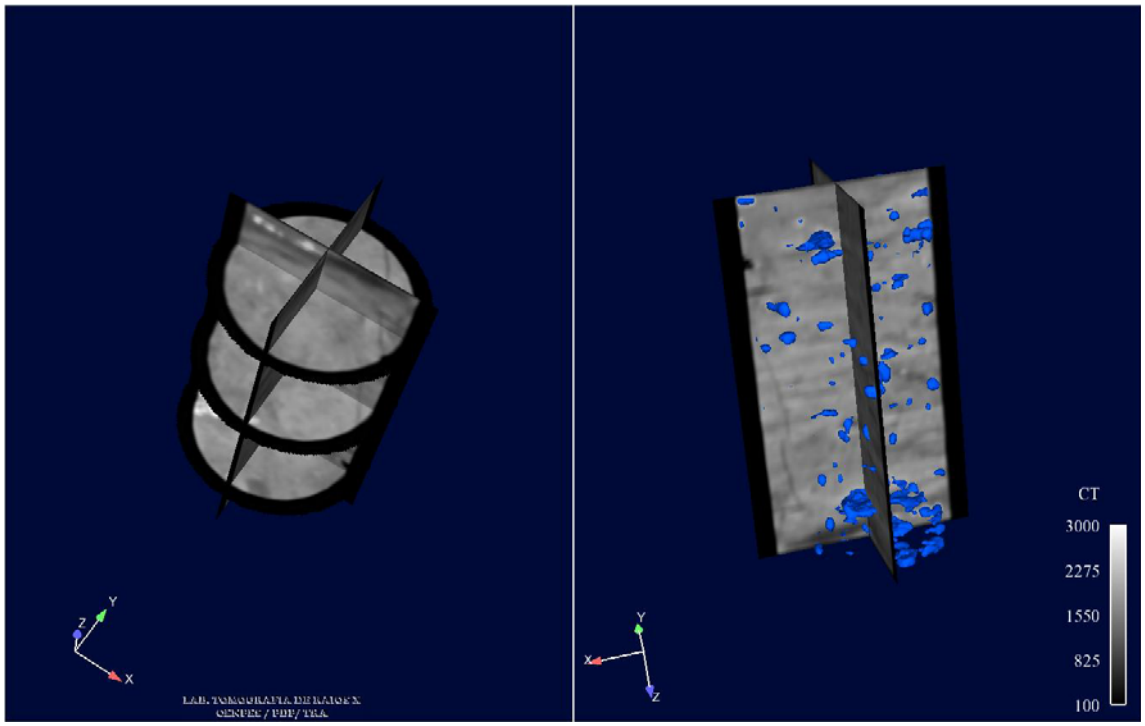
CP 06



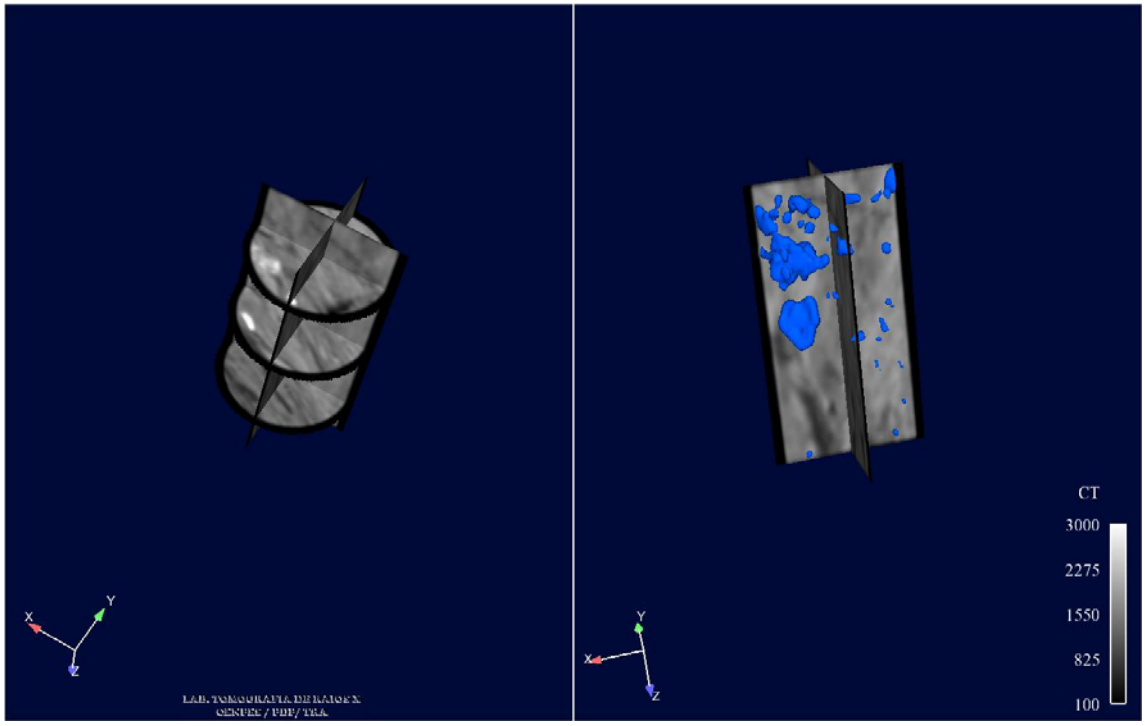
CP 07



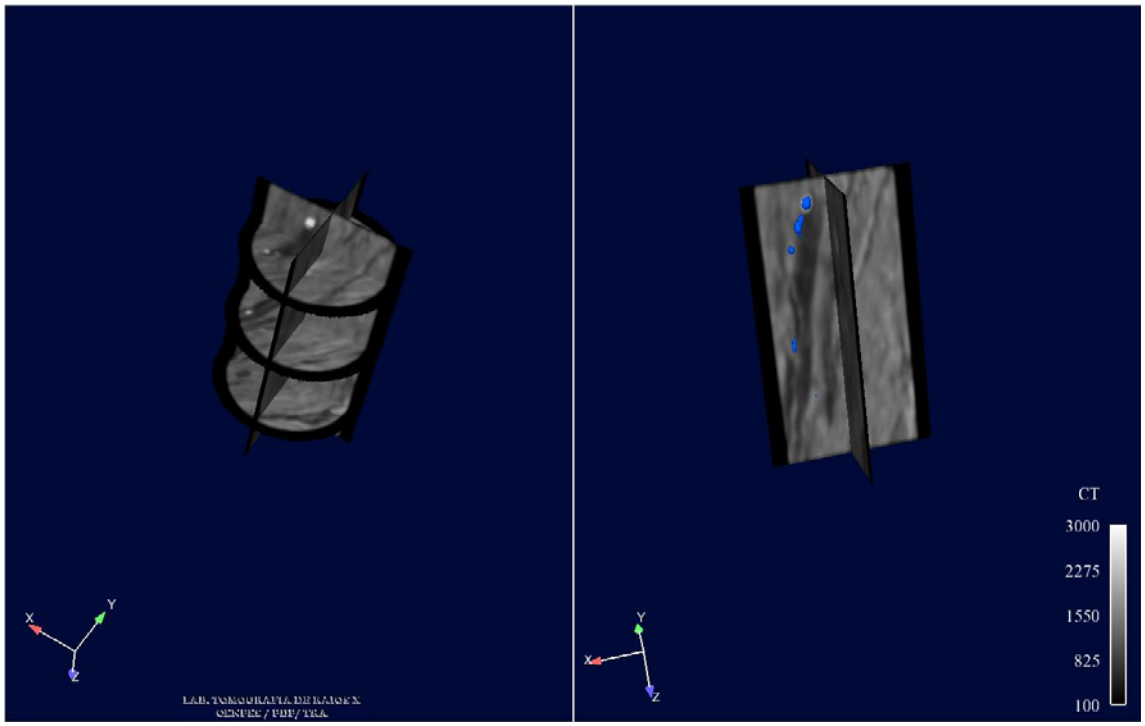
CP 08



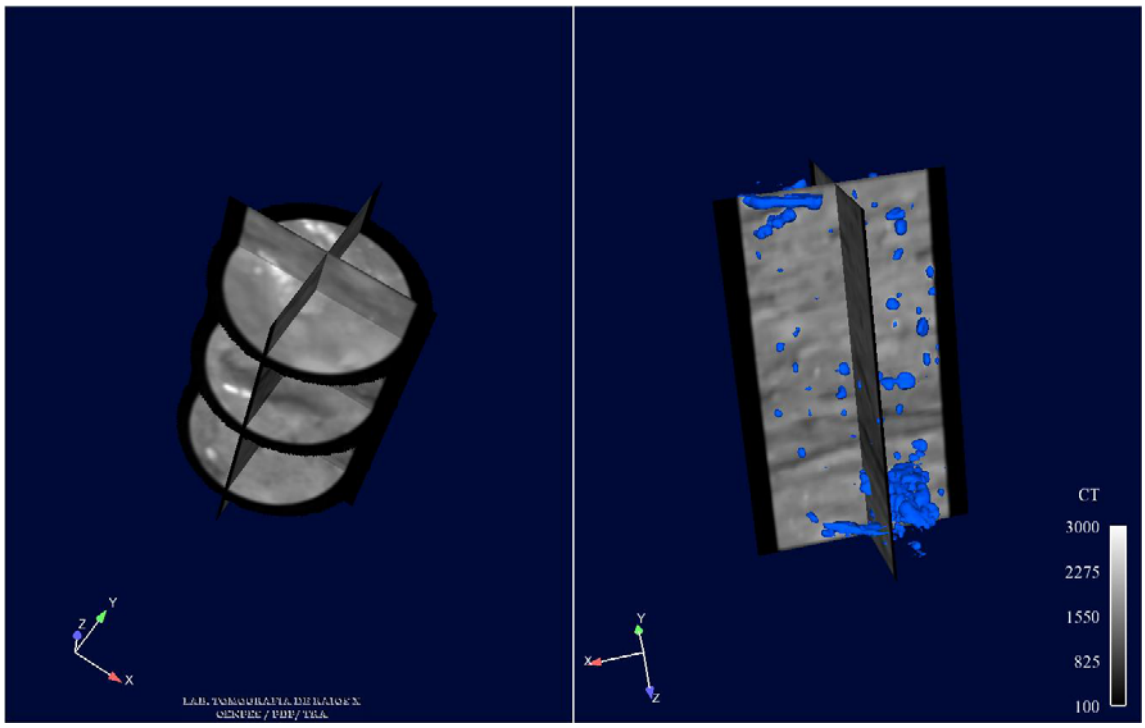
CP 09



CP 10



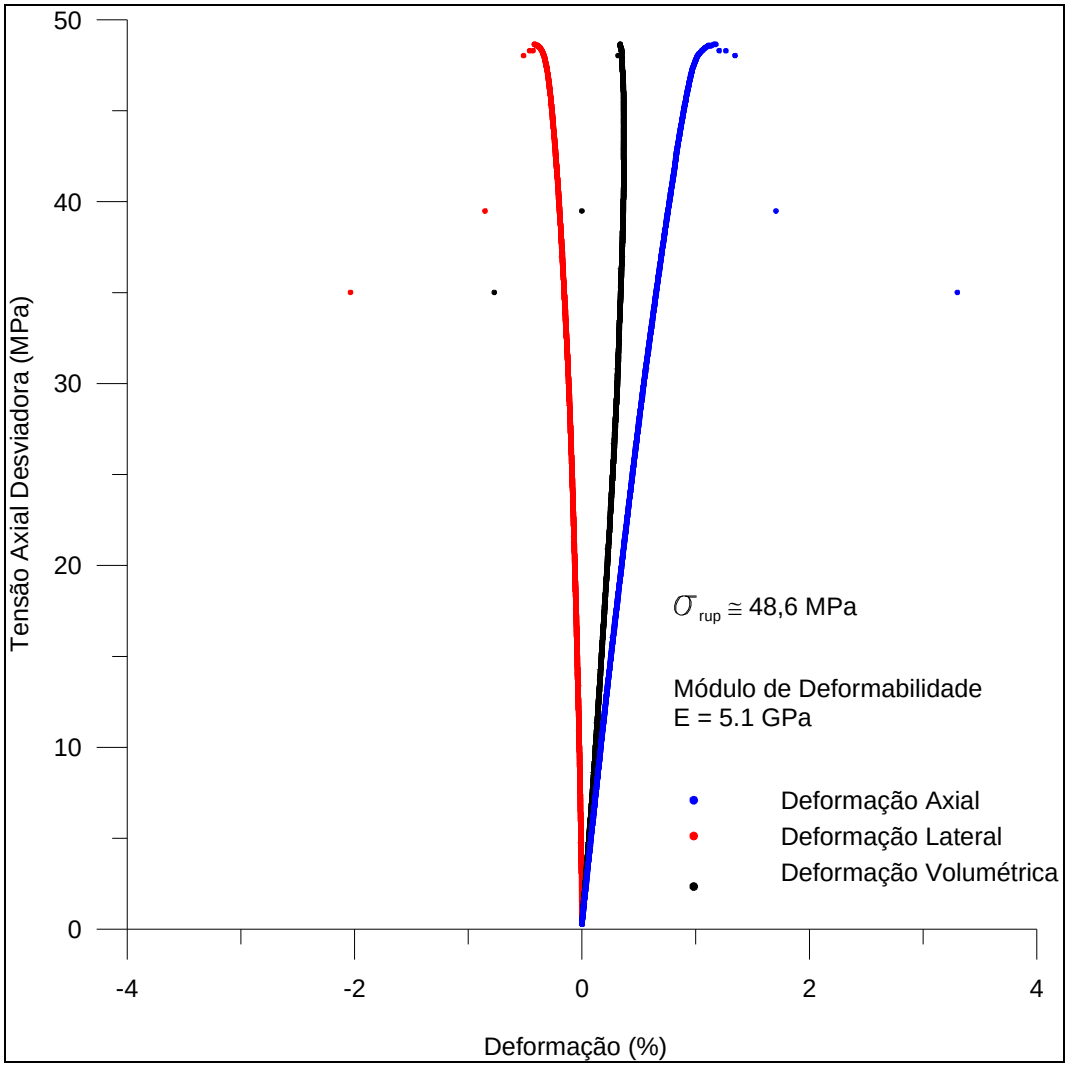
CP 11



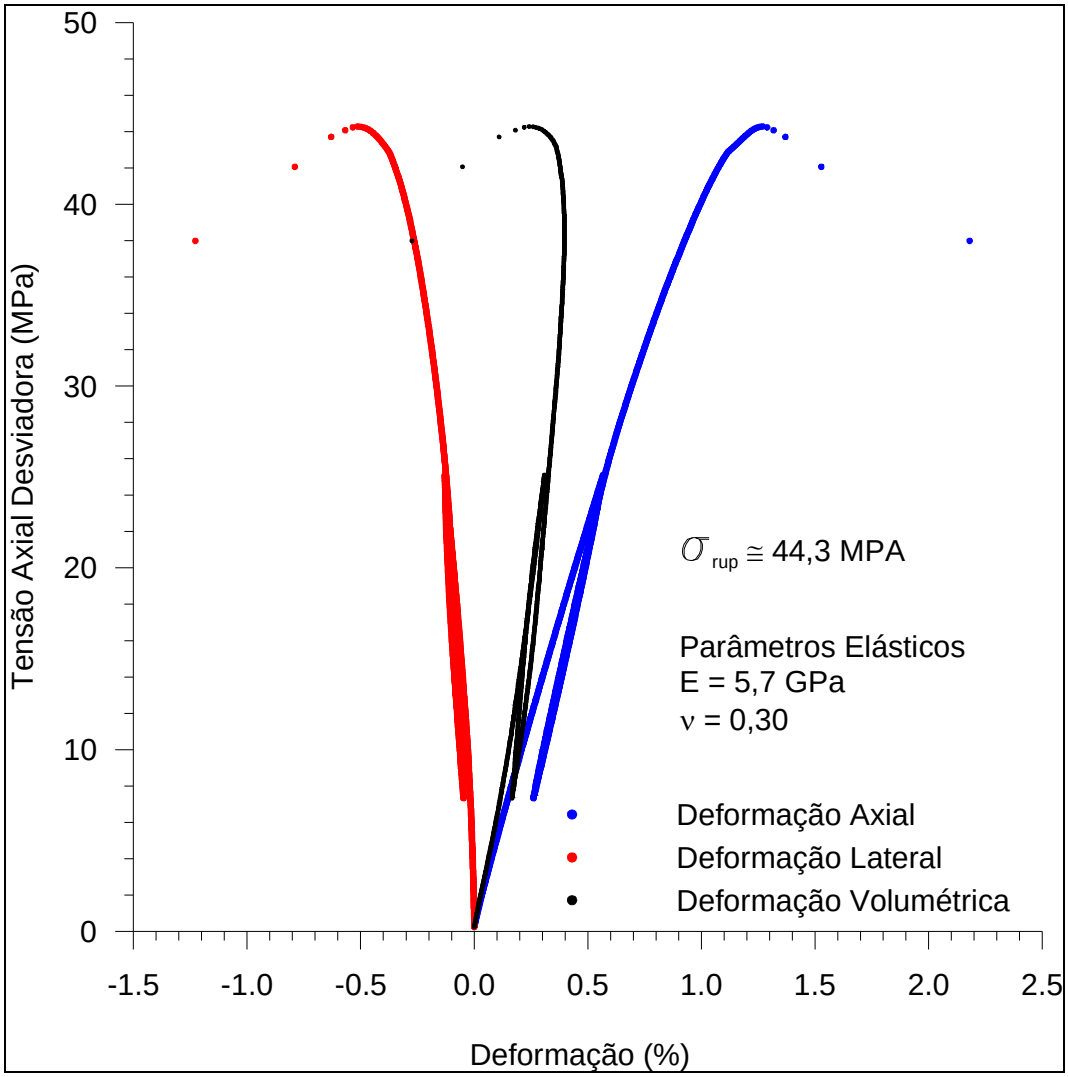
Apêndice C

Resultados dos Ensaios Mecânicos

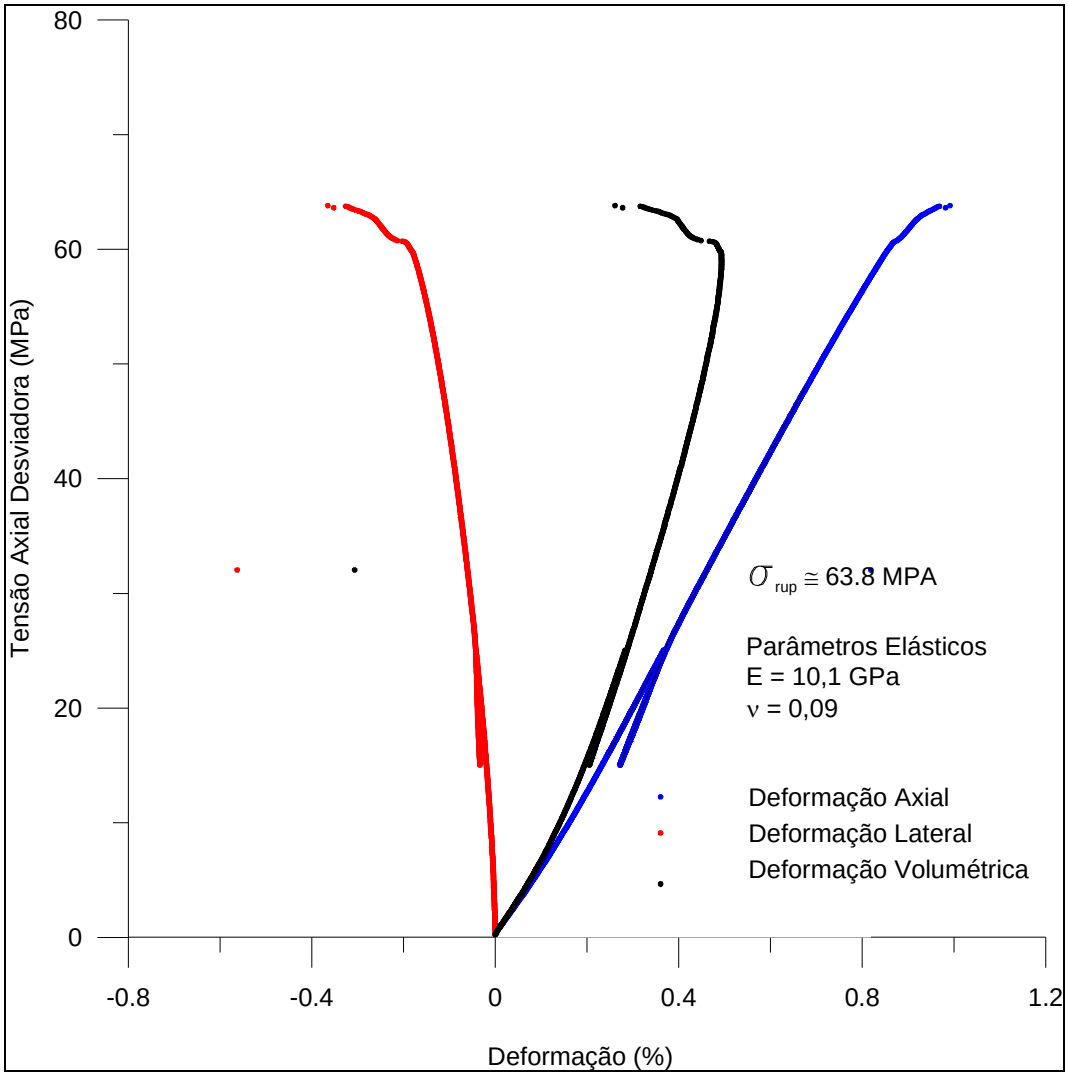
Ensaio Triaxial CP 12 - Tensão Confinante 20 MPa



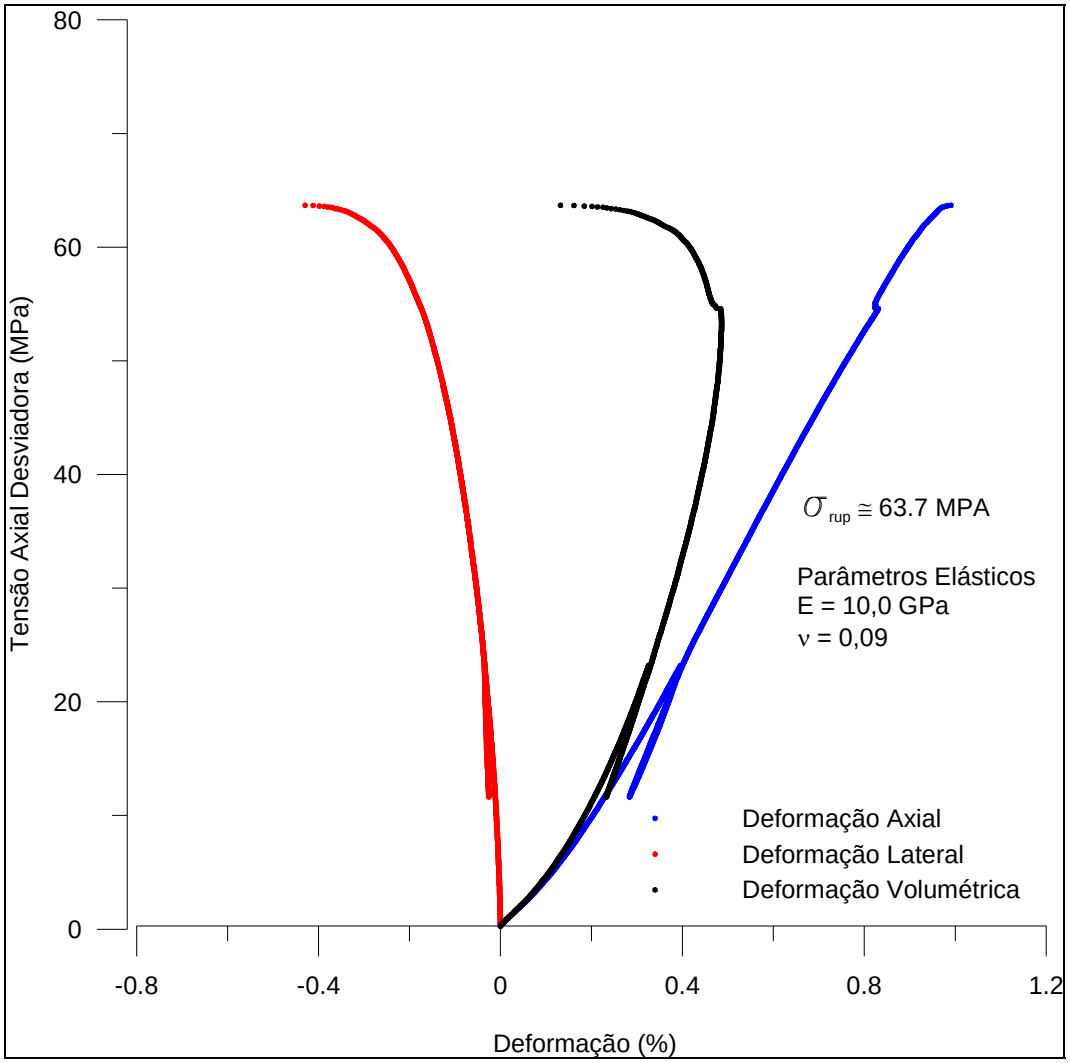
Ensaio Triaxial CP 01 - Tensão Confinante 14 MPa



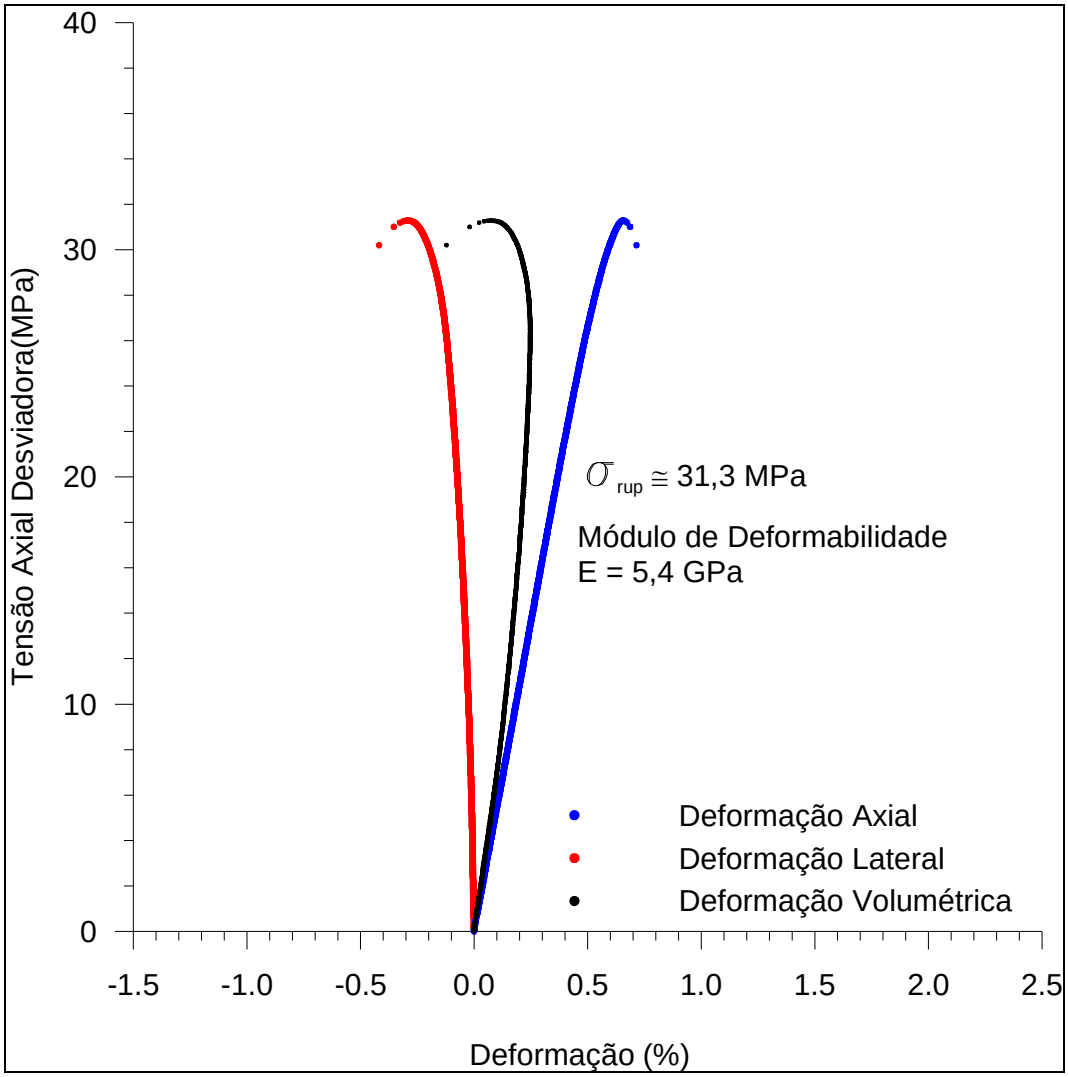
Ensaio Triaxial CP 11 - Tensão Confinante 10 MPa



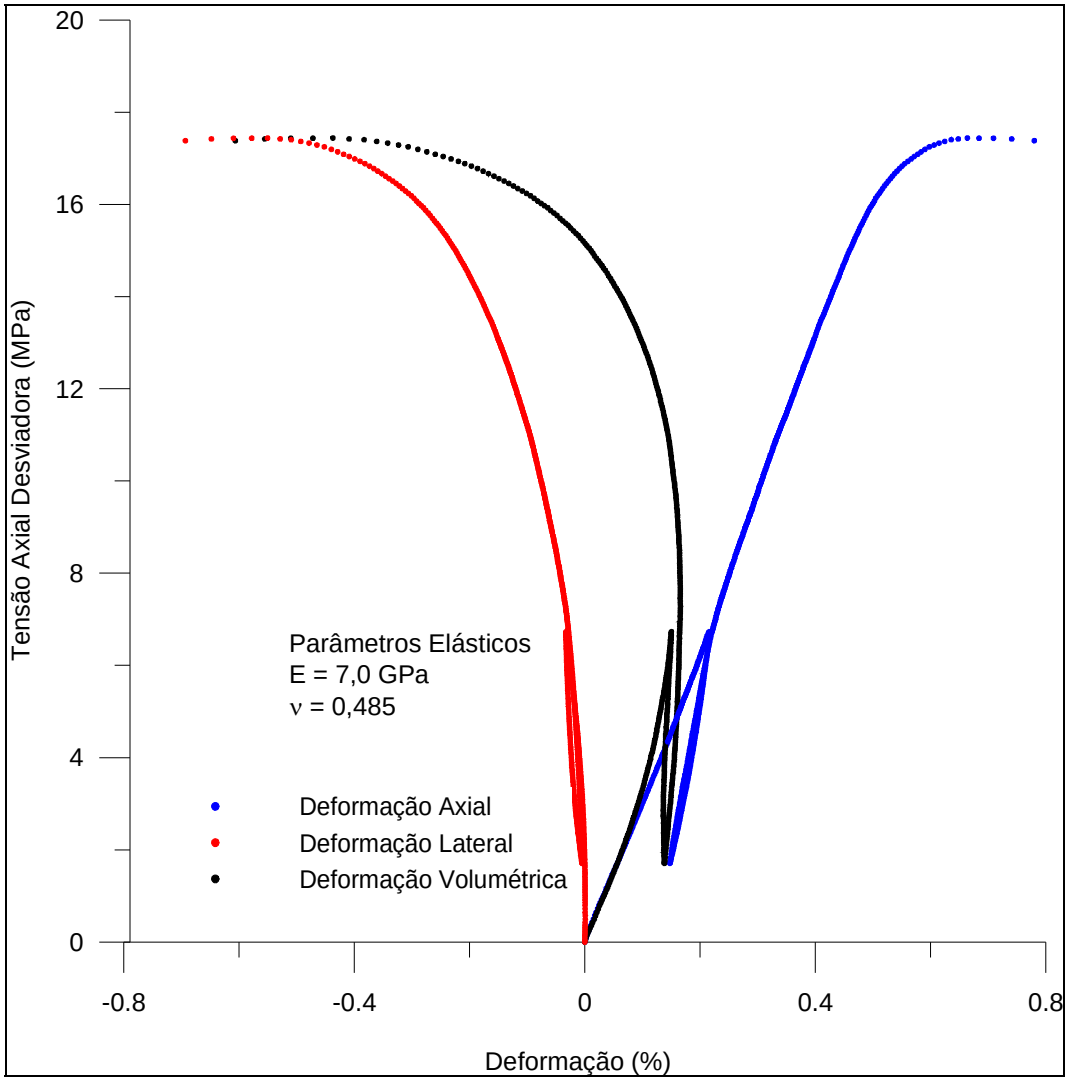
Ensaio Triaxial CP 08 - Tensão Confinante 5 MPa



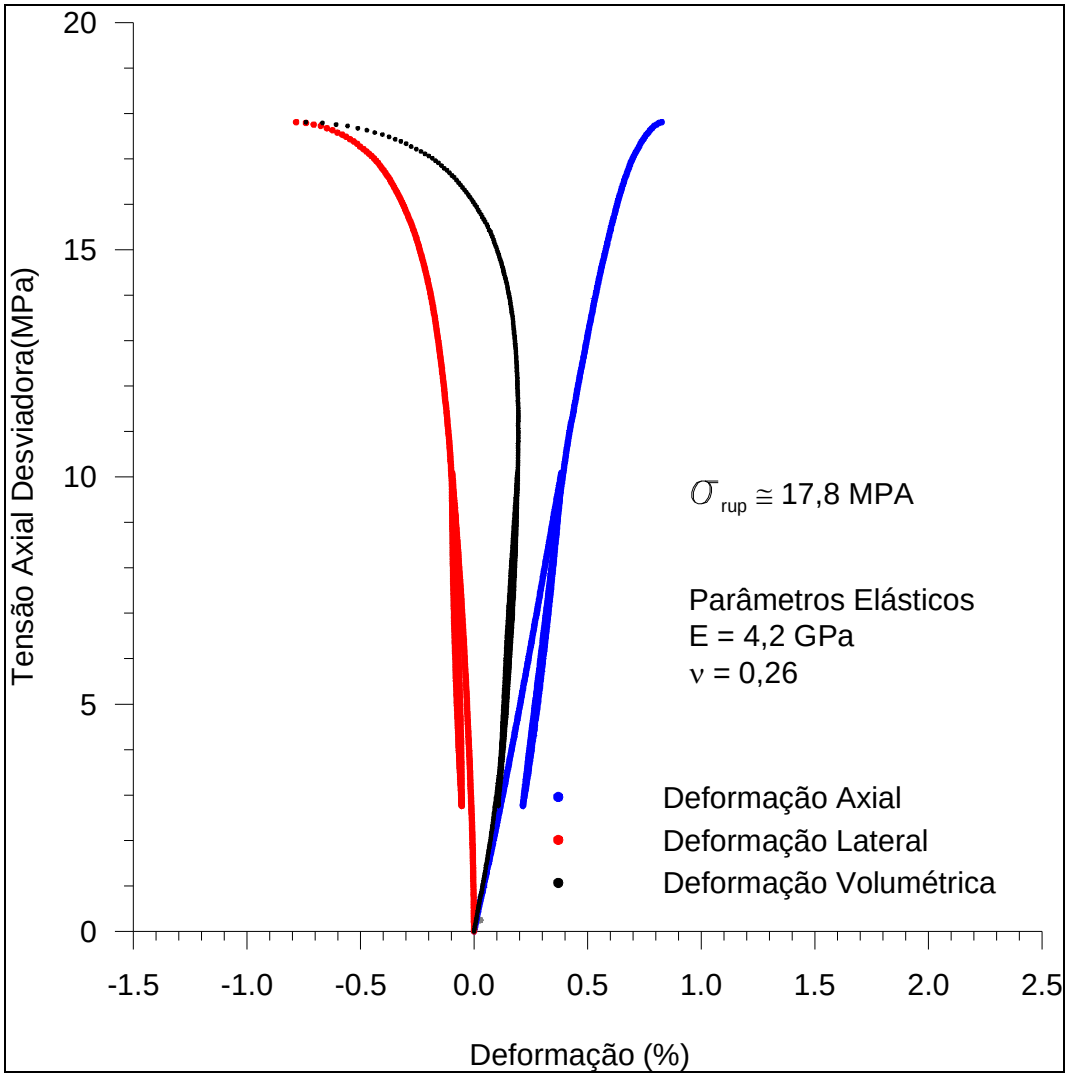
Ensaio Triaxial CP 03 - Tensão Confinante 5 MPa



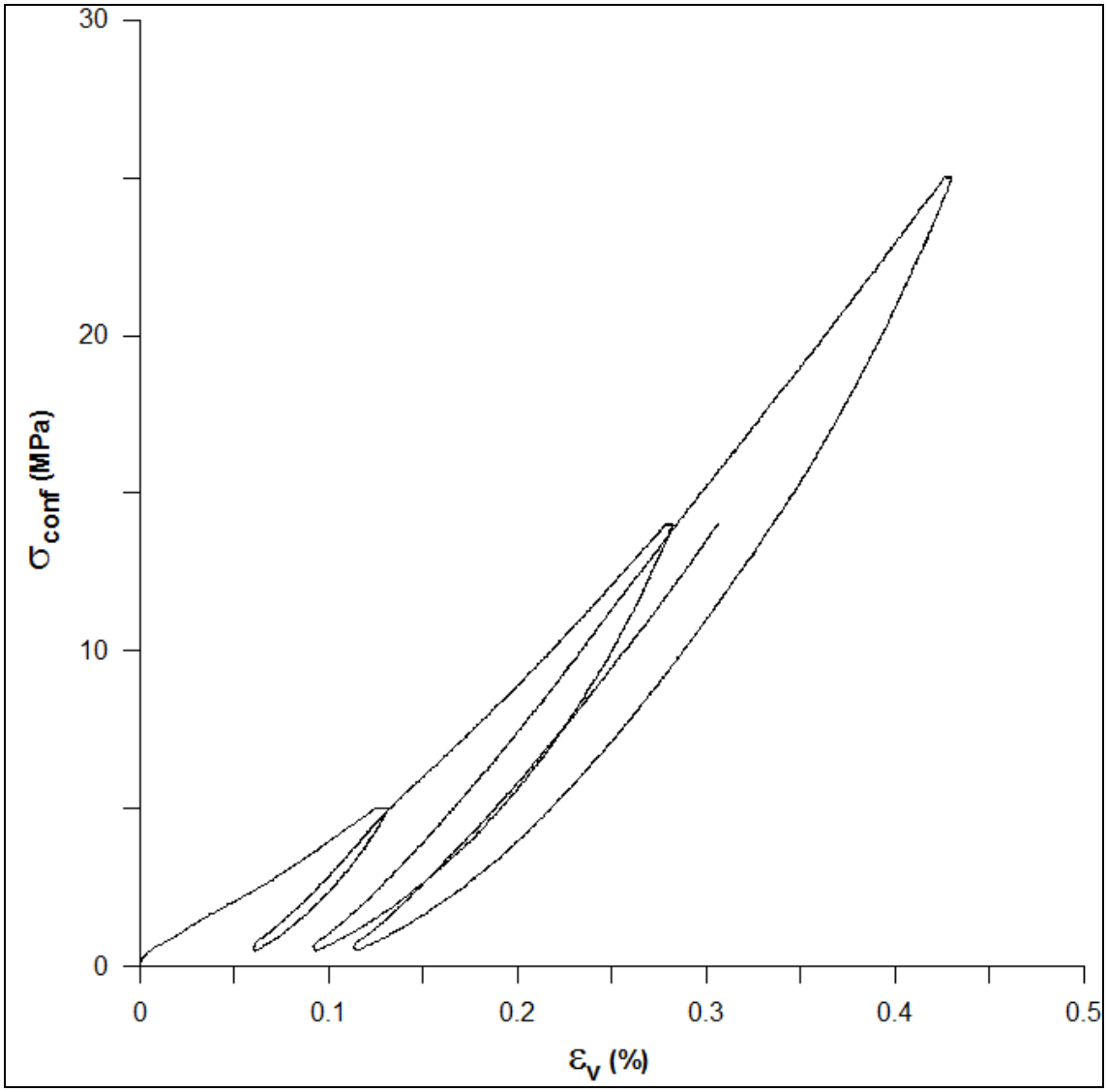
Ensaio Triaxial CP 04 - Tensão Confinante 2,5 MPa



Ensaio Triaxial CP 02 - Tensão Confinante 1 MPa



Ensaio de Compressibilidade Cíclica – CP 13



Ensaio Triaxial CP 13 - Tensão Confinante 14 MPa