

Working Group 1 Summary (Materials and Surfaces)

1. Studies at CERN have shown a low temperature (150-250C) desorption peak observed in 441/444 ferritic steels that are doubled rolled for appearance. To be avoided.
2. Outgassing behavior of mild steels and ferritic steels are acceptable for use in CE and ET:
 - The four contribution labs should post their data and methods in a joint forum
(ie, paper in CE-ET Vacuum Studies Group)
 - H₂, CH₄ and CO_x are 100 times than 304L ss
 - H₂O outgassing is about the same or 10x worse than SS before bakeout
 - Collect and post the outgassing results from all four participating labs
3. We still need > 100C bakeout for removing H₂O from mild and ferritic steels
4. Work to be done to lower costs of bakeout: induction heating, clean, dry gas purging experiments

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5. Investigate and quantify the industrial capabilities of producing ferritic steel large beam tubes.
6. Investigate the potential problems with environmental corrosion and stress corrosion of ferritic steels
7. Investigate how to leak check mild steel beam tubes that might be coated with epoxy for corrosion protection.
8. Assess the vacuum performance of baffle coatings (black nickel/DLC)
9. Continue to investigate a more favorable passivation layer can be “naturally grown” on mild steels during or after the manufacture process
10. Continue to compare beam tubes the cleaning methods: wet chemical, plasma, laser treatments for cost effectiveness

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11. Investigate heat treatment to remove mill scale
12. H permeability parameters of ferritic steels should be defined.
13. This Working Groups encourages the continuing work of the ET-CERN group, CEBEX group and CE Vacuum Studies Group to further study the issues highlighted in this Working Group
14. Cost estimates should be made for CE and ET with respect to the use of the candidate materials (SS, Ferritic, mild steels)