Low-energy d+d fusion reactions via the Trojan horse method

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The bare nucleus S(E) factors for the ^{2}H(d,p)^{3}H and ^{2}H(d.n)^{3}He reactions have been measured for the first time via the Trojan Horse Method off the proton in ^{3}He from 1.5 MeV down to 2 keV. This range overlaps with the relevant region for Standard Big Bang Nucleosynthesis as well as with the thermal energies of future fusion reactors and deuterium burning in the PreMain Sequence phase of stellar evolution. This is the pioneering experiment in quasi free regime where the charged spectator is detected. Both the energy dependence and the absolute value of the S(E) factors deviate by more than 15% from available direct data with new S(0) values of 57.4±1.8 MeVb for ^{3}H+p and 60.1±1.9 MeVb for ^{3}He+n. None of the existing curves is able to provide the correct slope of the new data in the full range, thus calling for a revision of the theoretical description. This has consequences in the calculation of the reaction rates with more than a 25% increase at the temperatures of future fusion reactors. This work has been published in Phys. Lett. B.