

MEMORANDUM

To: R. Fata
From: J. Zajac
Subject: Teflon Seal Adhesion
CC: D. Fabricant



27 October 2007

This memo details the tests performed on Teflon seal adhesion. Two methods of treating Teflon were tested. Sodium Ammonia Etch from Porter Process Inc. and a Sodium Naphthalene Etch from Acton Technologies. Corona etching was considered however the bonding must take place within hours of the treatment. This is not a realistic option.

A plate of 7050 Aluminum with a T7451 heat treatment was used to build test samples for both shear and peel tests Figure 3 & Figure 4. The aluminum blocks were machined with a #63 finish and compared to a finish gauge. The blocks were ultrasonically cleaned in acetone then wiped with propanol and Kimwipes. The bond area was regulated by trimming 10 mil thick shim stock to a 1" by 0.15" cut out. After the bond cured for 1 week, the Teflon was trimmed and the shim stock removed. The spacing between the blocks on the shear tests was 0.25" and ~1.65" on the peel samples.

The adhesive used was Loctite Hysol 9313 mixed 80% by weight with Siltex 44 silica powder. The mixture was outgassed by standard methods.

The instructions from both Porter Process and Acton Technologies were to not clean or wipe the surface of the treated films. The product is ready to use.

Samples were also soaked in LL5610 for 4 ½ months and then tested on the Instron.

Bonds were still strong. In shear, the Teflon stretched before the bond failed.

A second set of samples were made. The 7.5mil type A Teflon was heated to molding temperatures (550F) and sent for etching. It was bonded and tested under shear to see if the heating process degrades either the strength of the Teflon or the bonding treatment. Heatshear1 plot shows no significant decrease in strength although you can see the strength difference in the 7.5mil vs the 10mil Teflon.

A linear seal mold was designed and seals made with 7.5 mil type A Teflon. They were sent to Porter Process for treatment. These seals were bonded to the aluminum test blocks with the 2 techniques shown below Figure 1. New Fillet Bond & Figure 2. Old Bond. Tests show that the new fillet type bond is stronger since the old bond is more of a peel type failure.

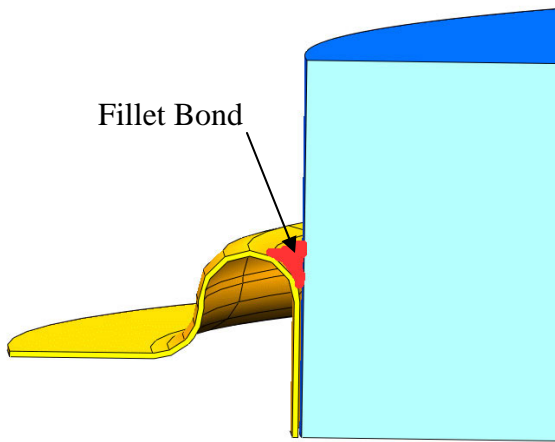


Figure 1. New Fillet Bond

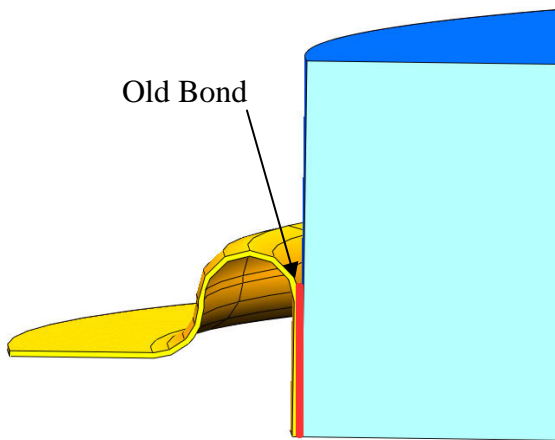


Figure 2. Old Bond

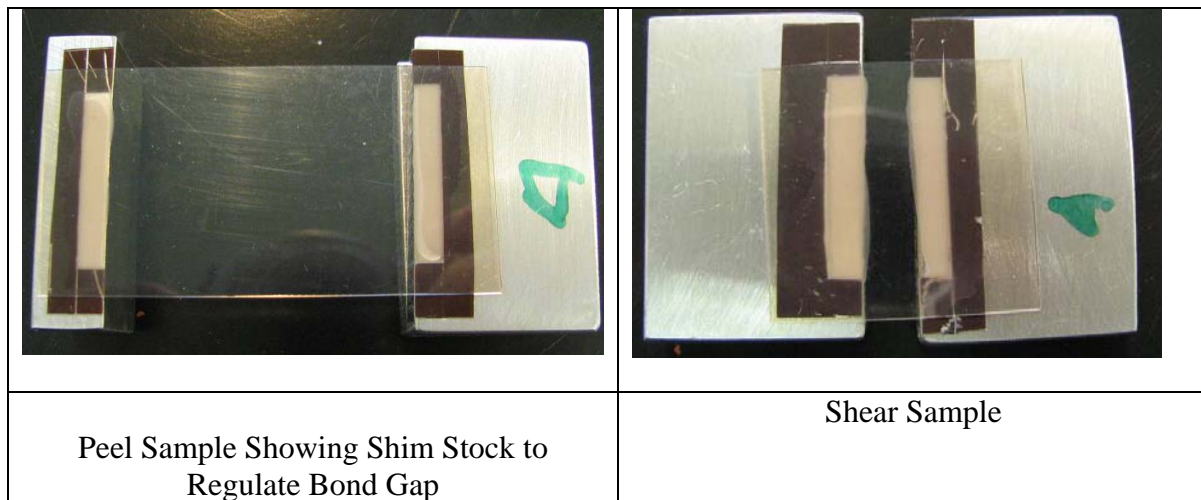


Figure 3. Samples Before Test

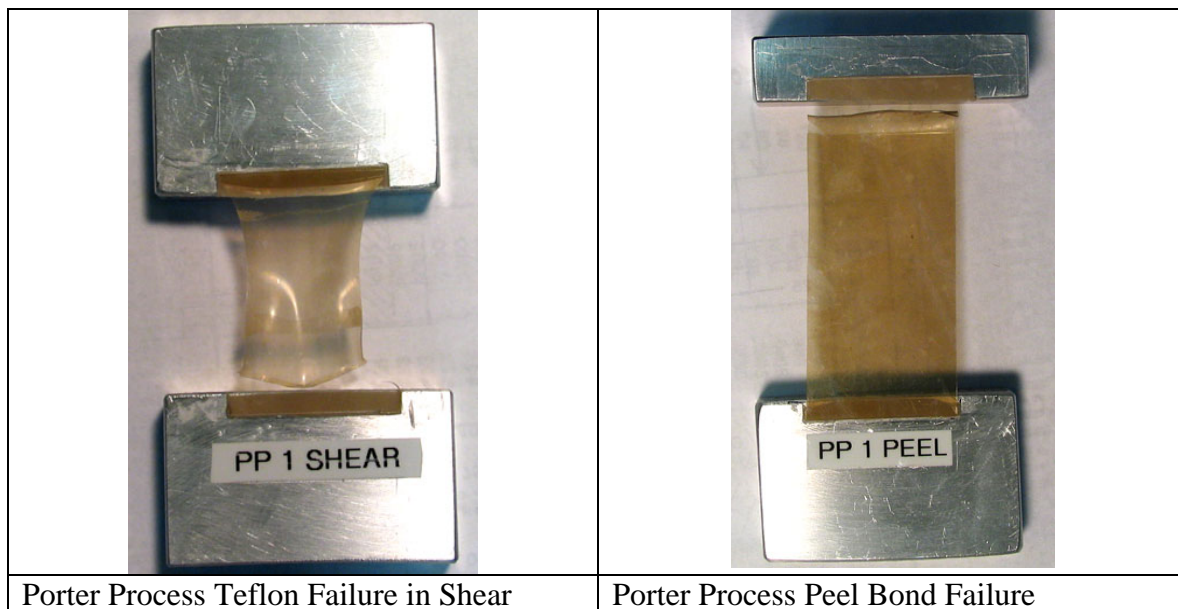
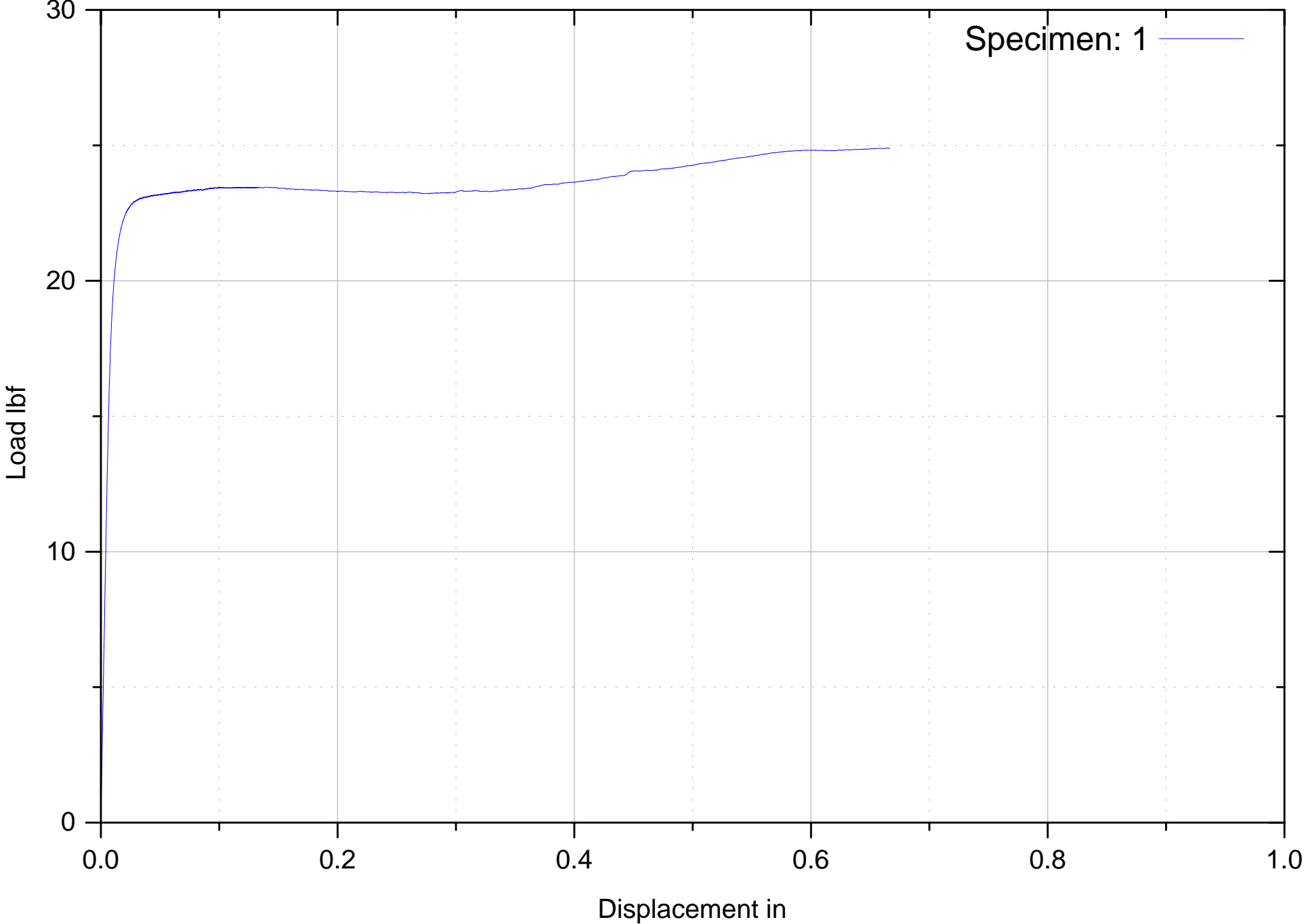
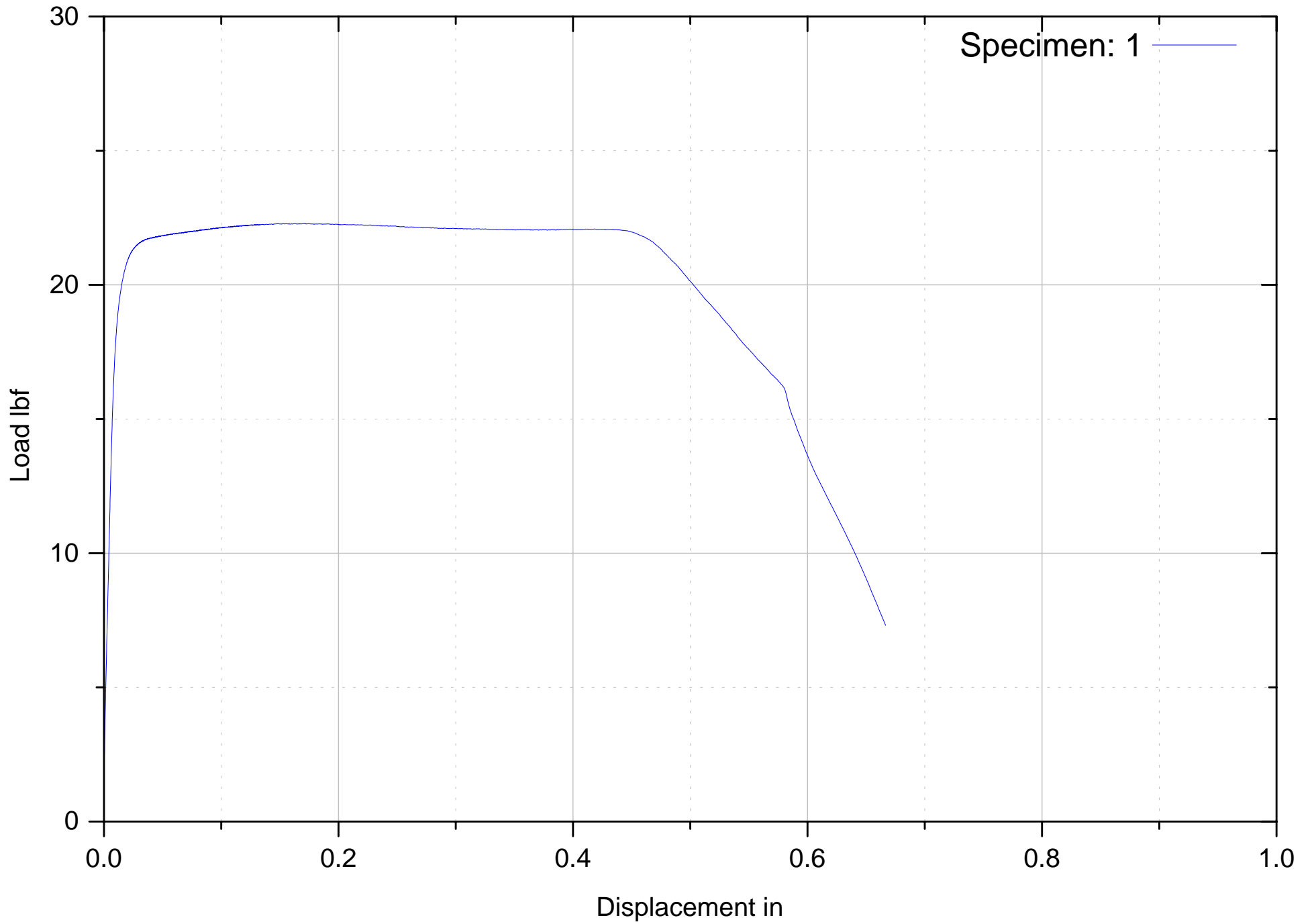


Figure 4. Samples After Test

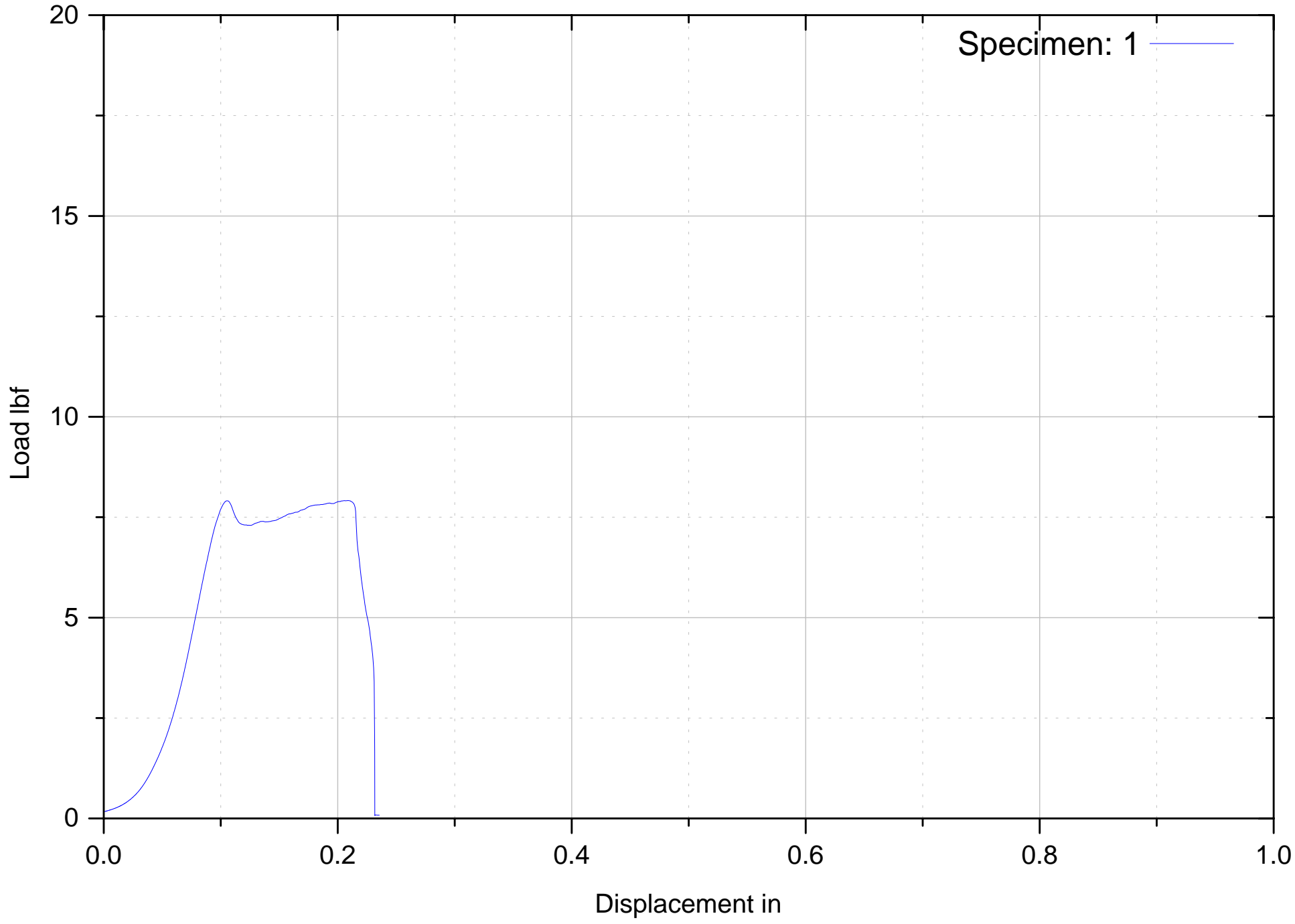
Sample ID: a1shear



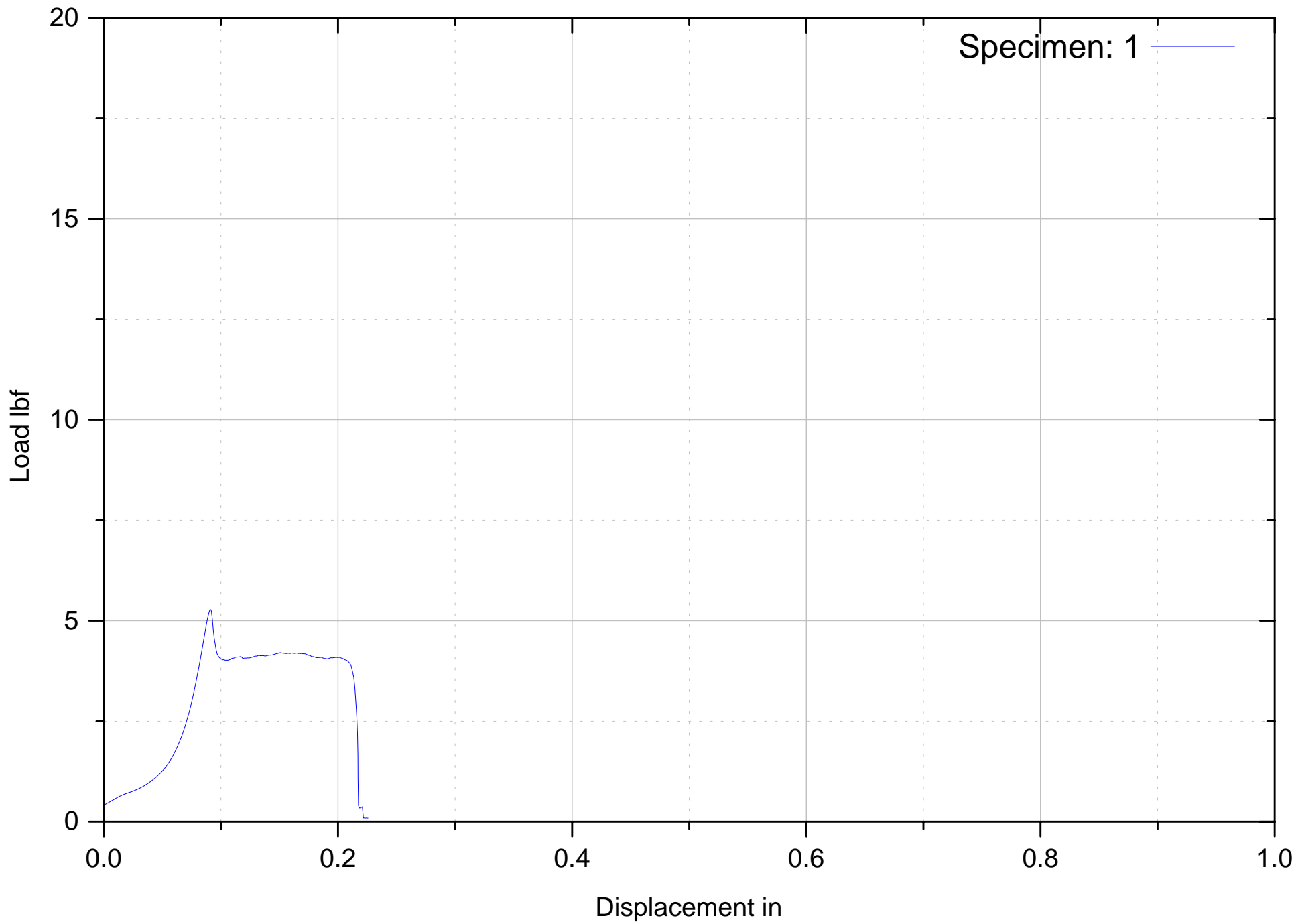
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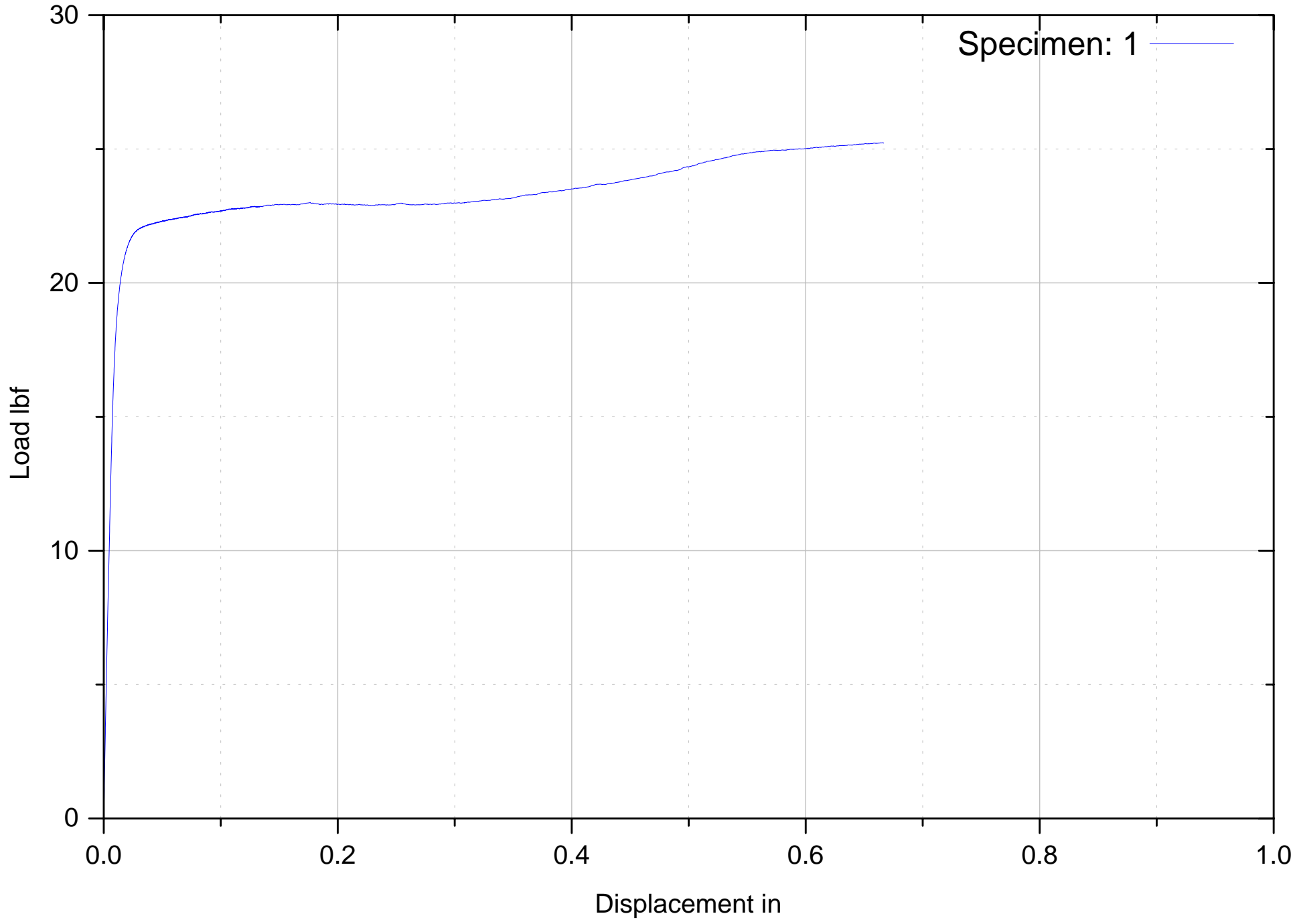
Sample ID: a1peel



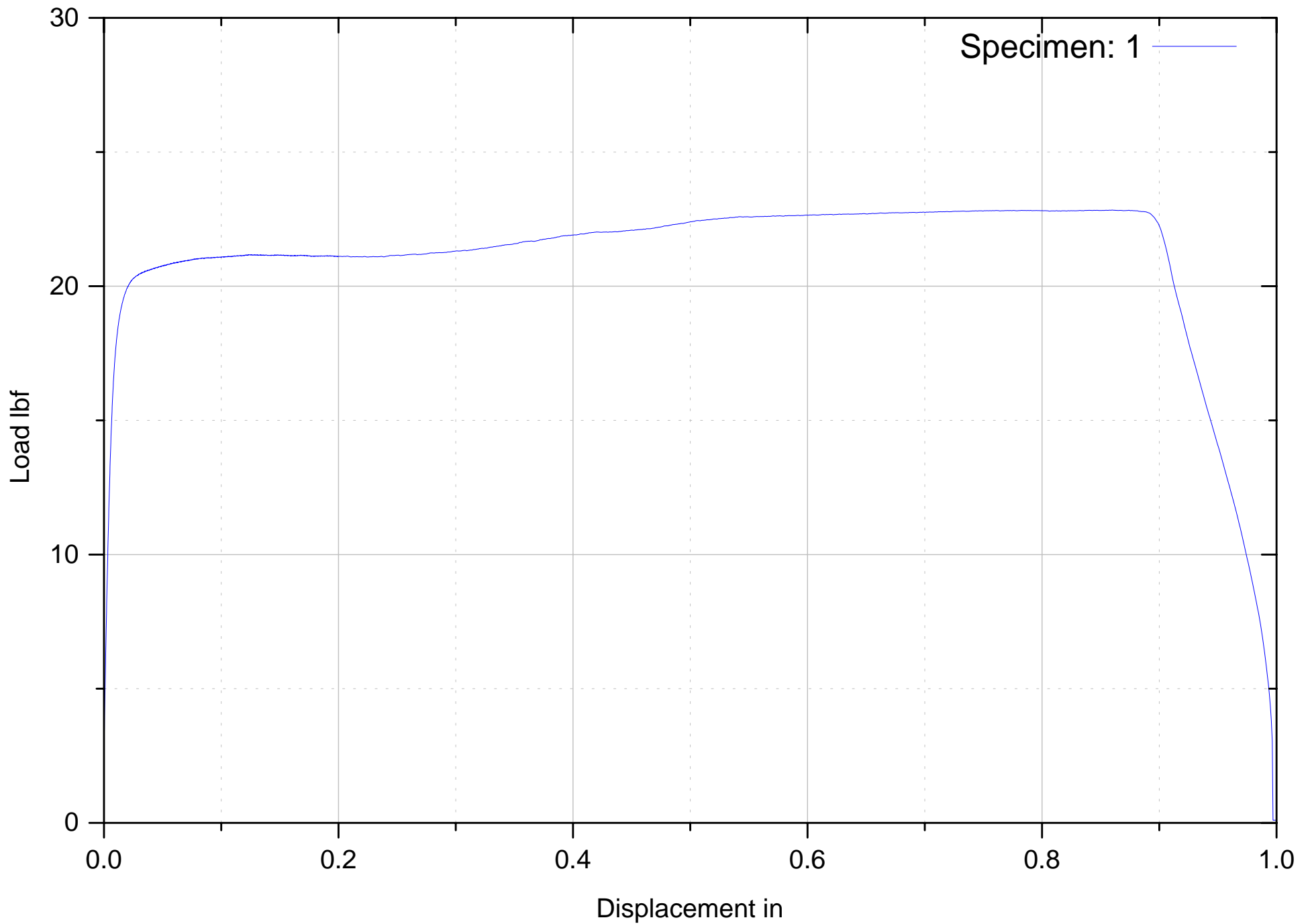
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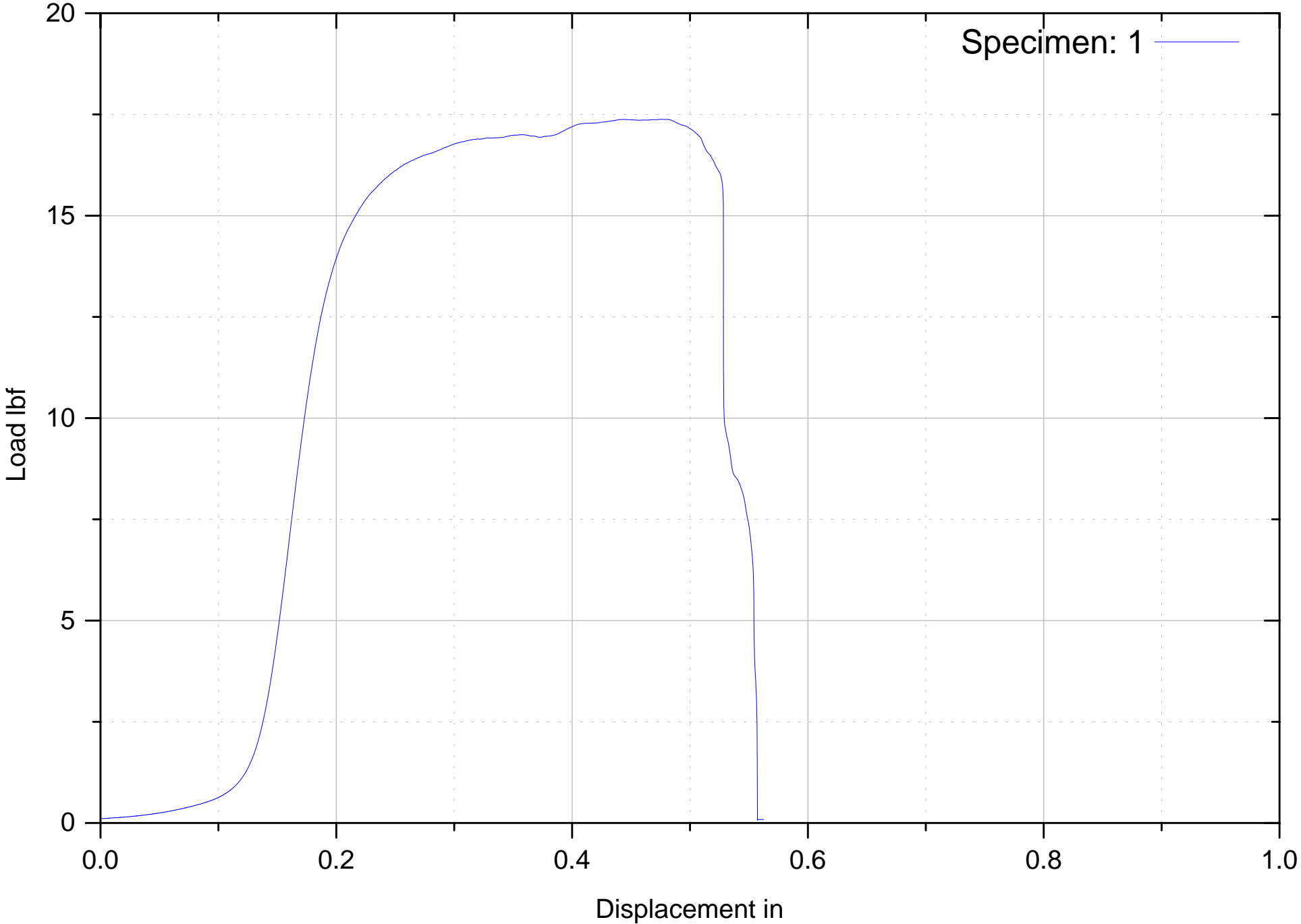
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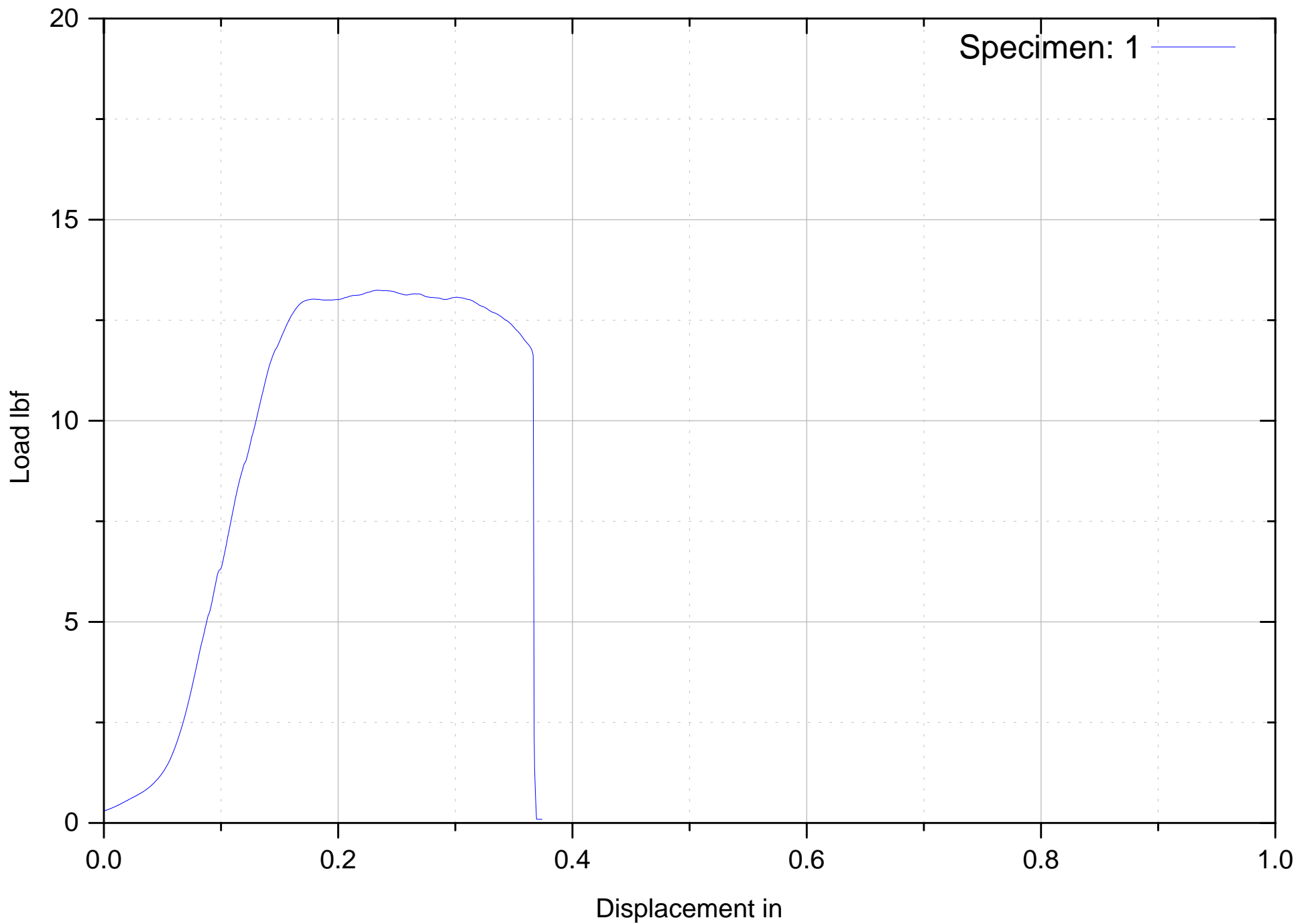
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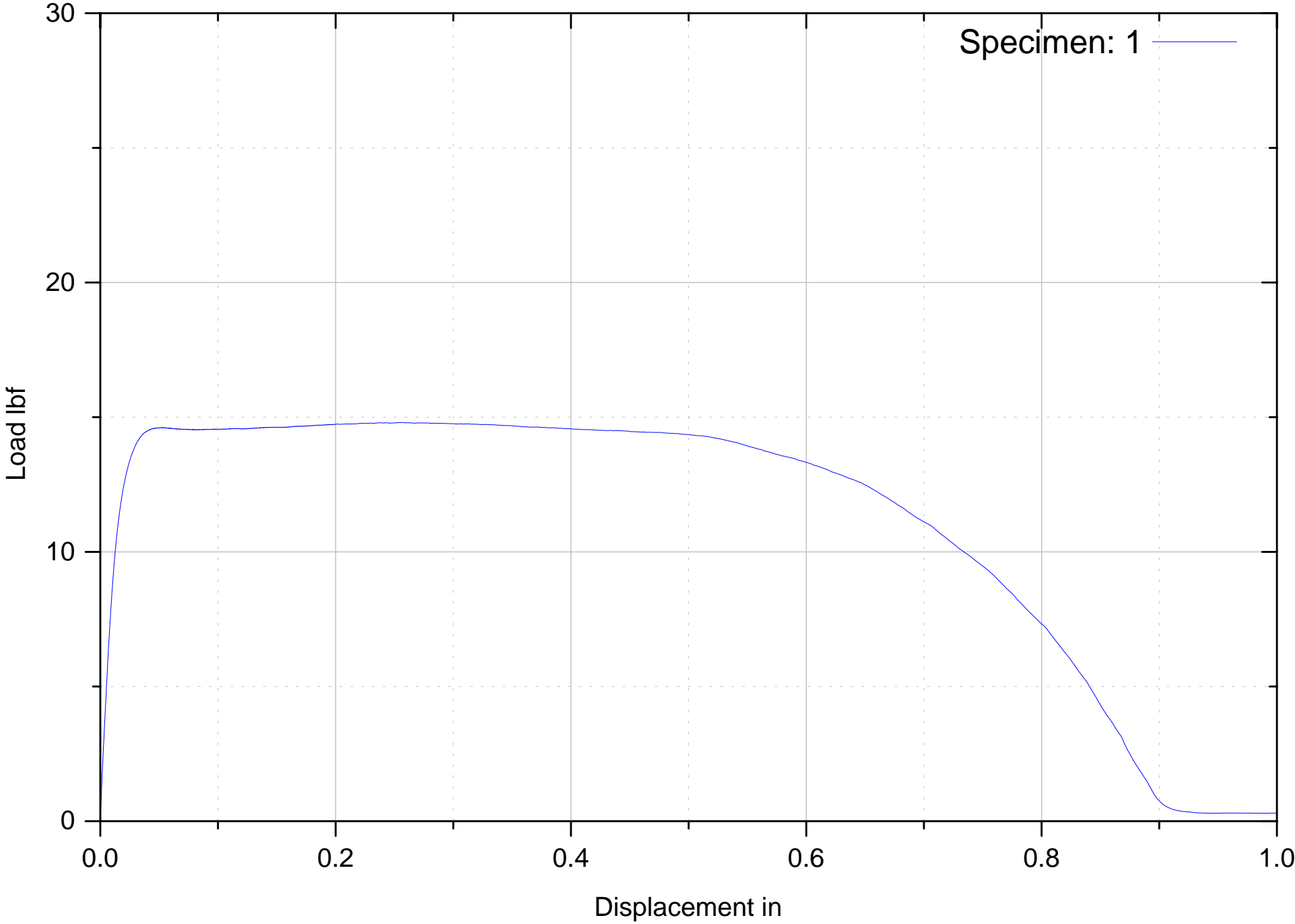
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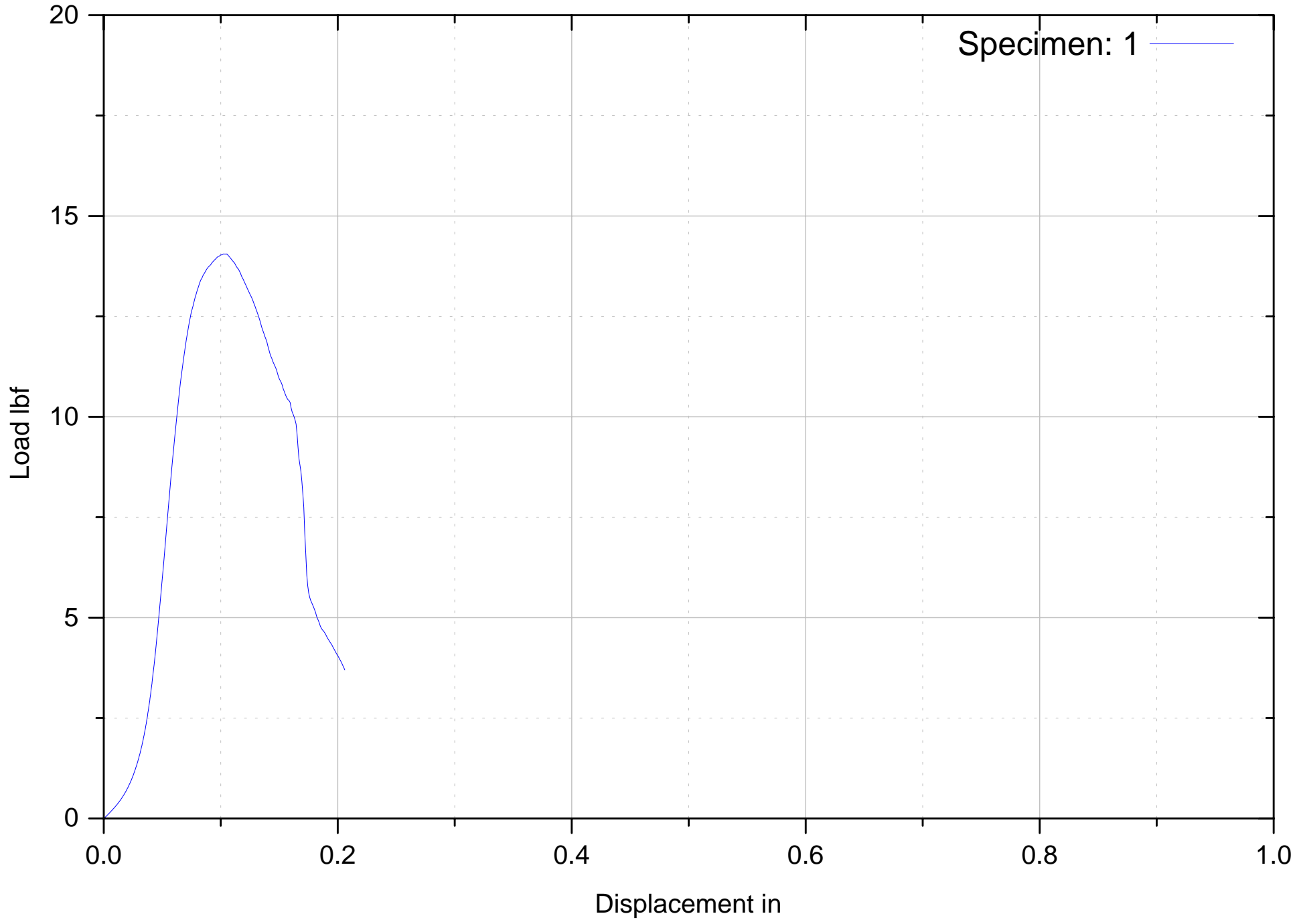
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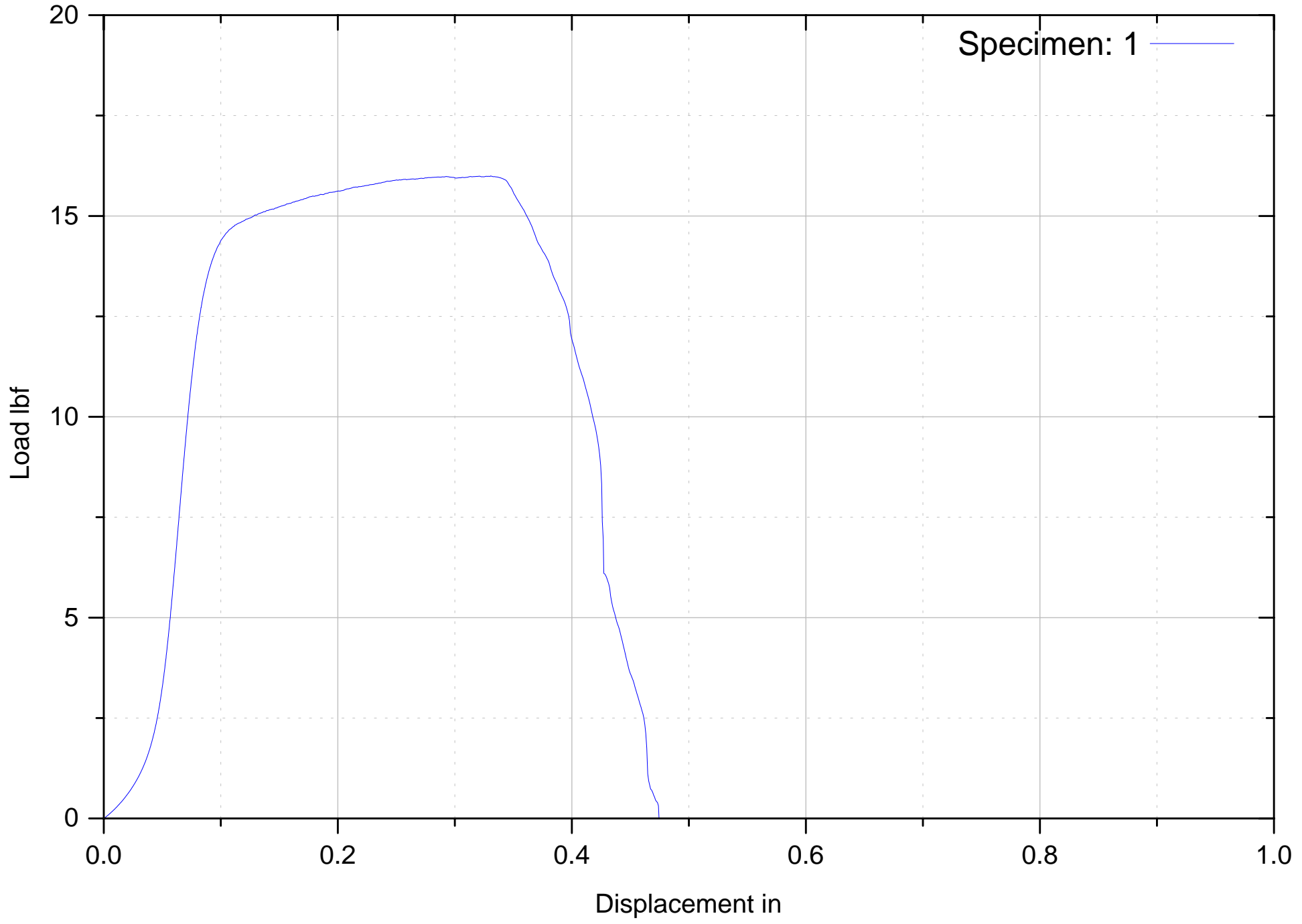
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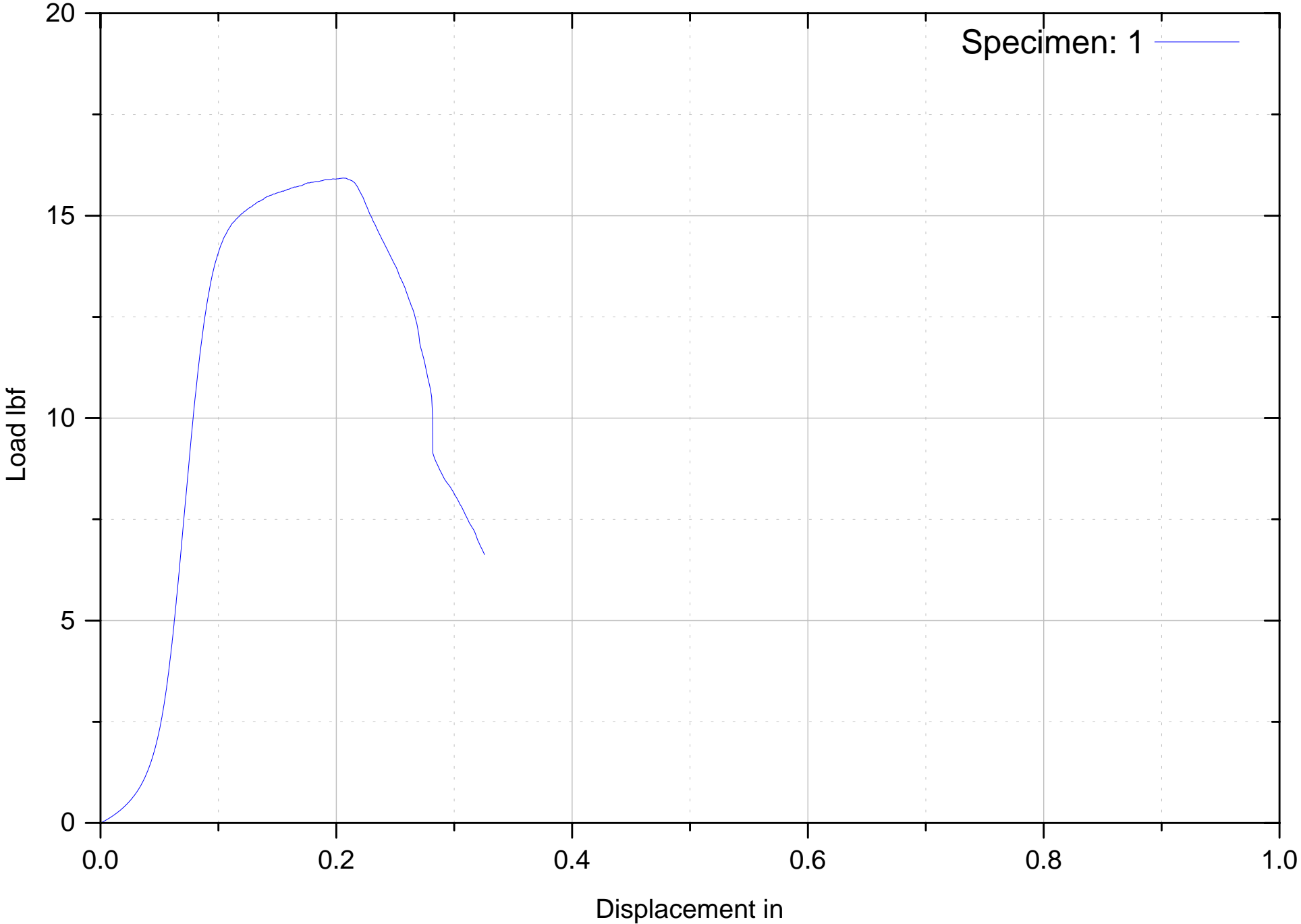
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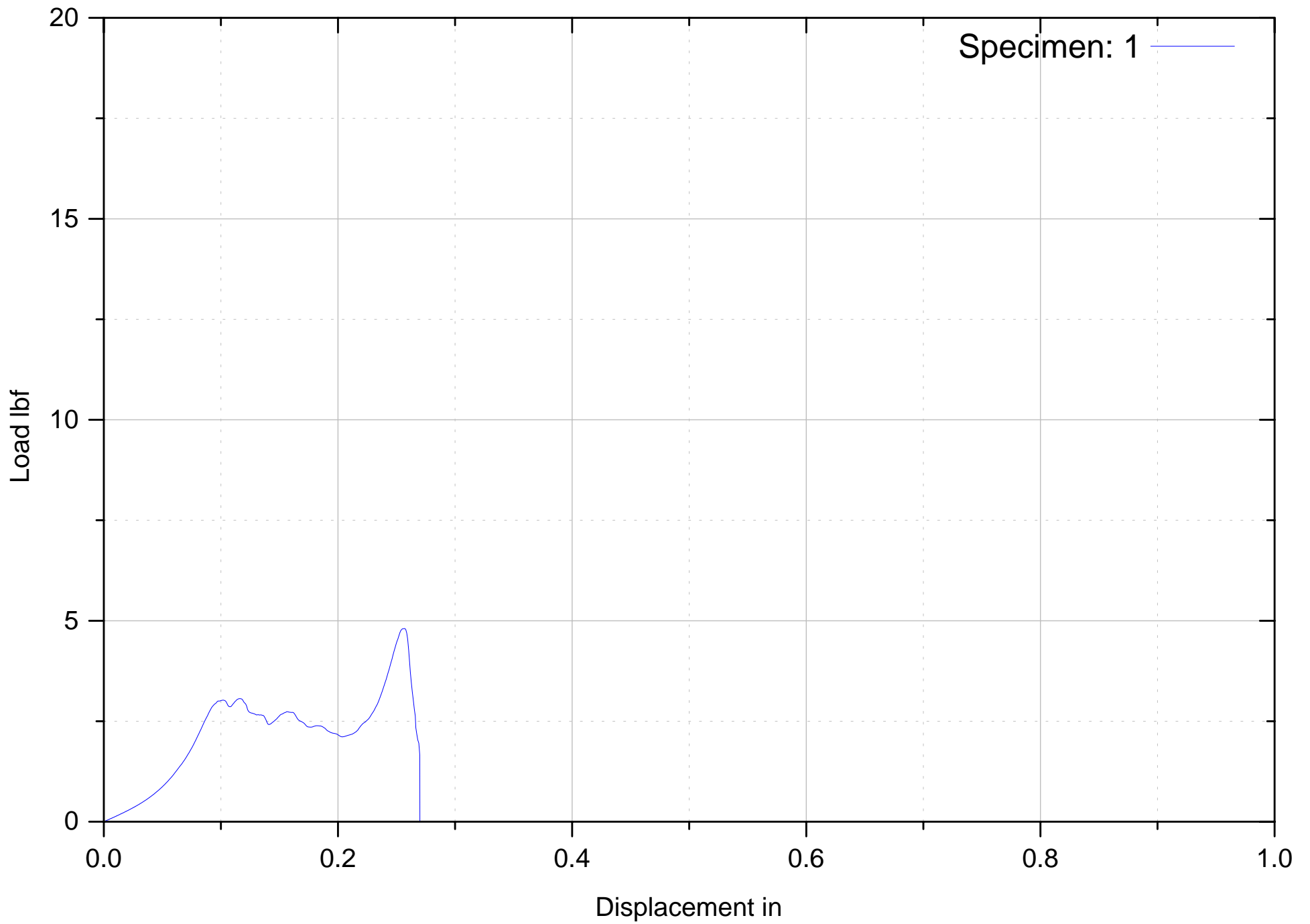
Sample ID: Fillet Bond 2



Sample ID: fillet_bond_3



Sample ID: Old Bond 1



Sample ID: Old Bond 2

