

**3M Technical Brief: Rolling Flex Life of Common 3M Flat Ribbon Cables**

**Product Specification: 78-5102-0192-0**

**Revised Date: 2/19/2020**

### 1.0 Scope

This document is aimed to discuss the results of flex testing of various 3M cables. The ability of a cable to withstand repeated flexing without conductor failure is determined by the severity of the flexing (radius of flex) and by the composition and /or constructions of each conductor. The products included in the experimentation are shown below and the test conditions and environment are also discussed. Final product selection should be chosen correctly by a system designer, under proper conditions.

### 2.0 Products and Documentation

The specimens used in the rolling flex test all consisted of polyvinyl chloride(PVC) or halogen-free (HF), either 1mm or 0.50" pitch, 28 AWG stranded, 50 position, flat ribbon cables. The cables tested and their technical data sheets are shown below in Table 2.1.

#### 2.1 Products and Documentation Table

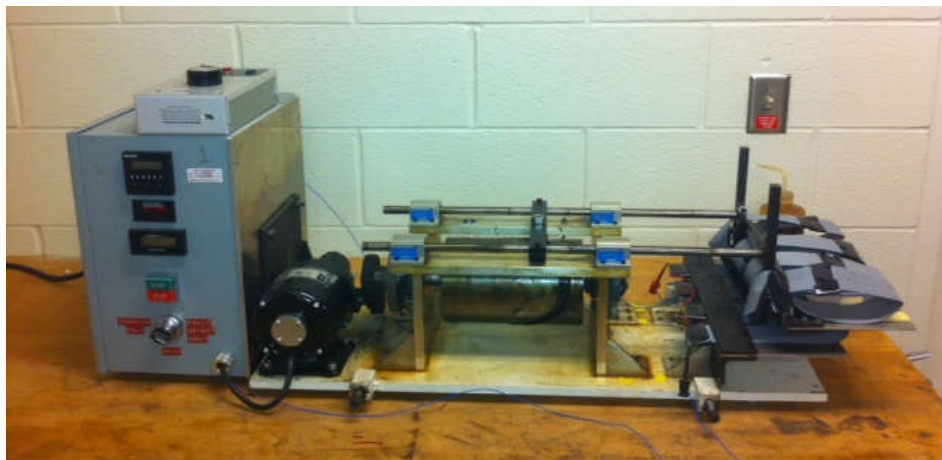
3M Part Number	3M Tech. Sheet Number
3365/50	TS-0080
HF365/50	TS-2334
3539/50	TS-0058
HF539/50	TS-2565
3319/50	TS-0059
HF319/50	TS-2342
3250/50	TS-2694

### 3.0 Test Conditions and Environment

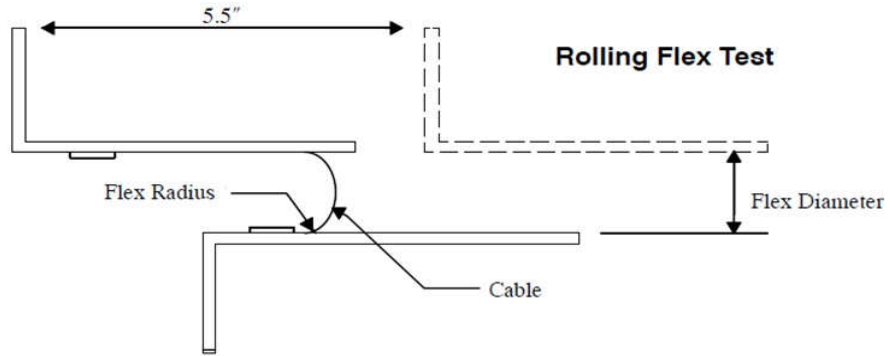
The rolling flex test is done by using an automated system shown in Figure 3.1. Test specimens, being all 50 positions, are soldered together in series and wired into the flex machine system. The cable specimens are attached to the two plates and a motor powered system drives the top plate shown in Figure 3.2 in a horizontal motion that creates a 180° bend at the adjusted radius. While the machine oscillates, a counter records the number of times flexed. When failure occurs in one of the wires, the machine stops oscillating and the counter stops until reset by the operator.

The plates also normally oscillate at around 50 cycles per minute. When failure is detected, the cable specimens are removed and the failure is found to ensure that it occurred in the flex zone and not where the cable was clamped or in the system-specimen interface. The values that were met by all samples are shown by the plot in Figure 3.3.

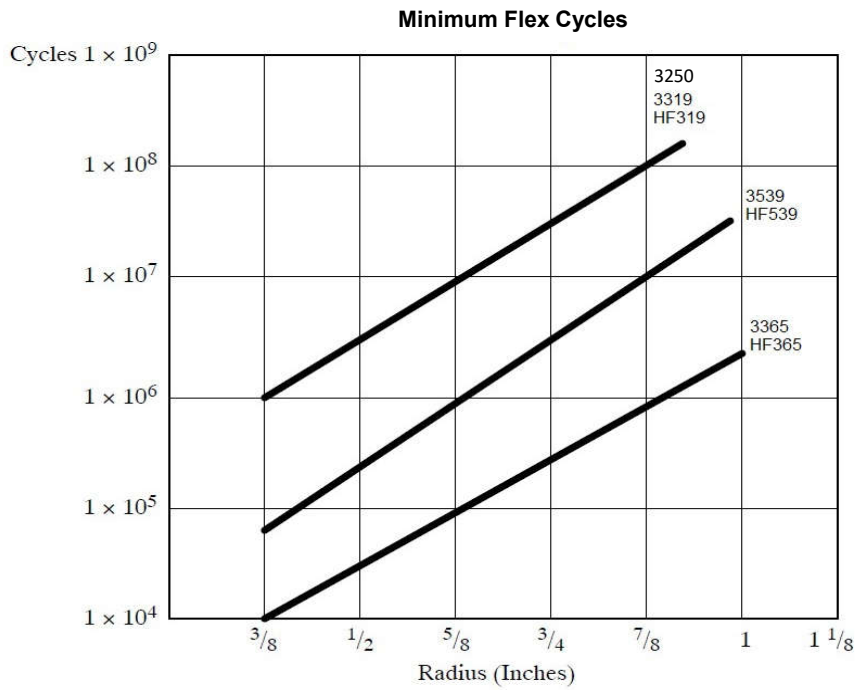
#### 3.1 Rolling Flex Test System



3.2 Rolling Flex Test (Plate Diagram)



3.3 Flex Cycles vs. Bend Radius



#### Definition of Halogen-Free

Halogen Free is defined as both 1) no halogen compounds that are intentionally added to the product or used less than 900 ppm chlorine and/or less than 1500ppm total bromine and chlorine. The latter are the levels set forth in certain industry standards for printed circuit boards, such as the International Electrotechnical Commission (IEC) 61249-2-21 standard. This information represents 3M's knowledge and belief which may be based in whole or in part on information provided by 3rd party suppliers to 3M.

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