Health & Safety Bulletin
3M™ Nextel™ 312, 440, 550, 610 & 720

Introduction
3M™ Nextel™ Ceramic Fibers are refractory aluminoborosilicate (312 & 440), aluminosilica (550 & 720), and alumina (610) fibers with diameters ranging from 7-13 microns. They are produced in continuous lengths. During manufacture, Nextel 312, 440, 550, 610, and 720 Ceramic Fibers are coated with organic sizings or finishes which serve as aids in textile processing. Nextel 312, 440, 550, 610, and 720 Ceramic Fibers pose no significant health risks under most conditions of use. Under certain conditions, however, Nextel 312, 440, 550, 610, and 720 Ceramic Fibers may cause health effects if not handled properly. The following information describes the nature of these potential hazards and gives recommended safe handling practices for minimizing the risks. Additional information is available in Material Safety Data Sheets (MSDS) and Product Toxicity Summary Sheets.

Fiber and Dust Inhalation
Although Nextel fibers are classified as ceramic fibers, they are manufactured in continuous lengths and have diameters (approximately 7 to 13 microns) which are not considered to be respirable by humans. Since they are not considered to be respirable, inhalation exposure to Nextel 312, 440, 550, 610, or 720 fibers is not expected to pose a carcinogenic risk to humans. They may, however, cause mechanical irritation of the nose and throat.

In certain operations, Nextel 312, 440, 550, 610, and 720 Ceramic Fibers may break to form a dust, particularly if the sizing has been removed or the fibers have been exposed to high temperatures. The potential for Nextel 312 Ceramic Fiber dust to cause biological effects was evaluated in an intratracheal instillation study in rats. Intratracheal instillation delivers test materials directly to the lower respiratory tract and thus bypasses the processes by which fibers and dust are normally filtered out in the upper airways when they are inhaled. In this study, Nextel 312 Ceramic Fiber dust caused lung inflammation with no evidence of more serious effects such as granulomas or fibrosis. A control group similarly exposed to quartz dust developed lung granulomas and fibrosis. From this study it was concluded that thepotential for Nextel 312 Ceramic Fiber dust to cause pulmonary fibrosis or other significant lung injury is minimal.

There is currently no specific OSHA Permissible Exposure Limit (PEL) or ACGIH Threshold Limit Value (TLV) for refractory ceramic fibers. The Refractory Ceramic Fiber Coalition (RCFC) has suggested an exposure limit of 0.5 fibers/cc for those fibers <3 microns in diameter. The RCFC suggested exposure limit is an organizational number rather than a regulatory number. However, since Nextel 312, 440, 550, 610, and 720 Ceramic Fibers are nonrespirable (fiber diameter of >3 microns), they are not covered by this suggested limit. Instead, Nextel 312, 440, 550, 610, and 720 Ceramic Fibers are covered by the OSHA PELs for "particulates not otherwise regulated" of 15 mg/m^3 as total particulate and 5 mg/m^3 as respirable particulate. In addition, these fibers are covered by the ACGIH TLVs for "particulates not otherwise classified" of 10 mg/m^3 as inhalable (total) particulate and 3 mg/m^3 as respirable particulate. Both values are 8-hour time-weighted averages. 3M recommends the ACGIH TLVs.

The EU directive 97/69/EC of December 5, 1997 is the European legal base for classification, packaging and labeling of certain man-made vitreous fibers. Laboratory studies have shown that certain man-made vitreous fibers have carcinogenic effects. Due to the fact that Nextel ceramic fibers do not meet the critical geometric dimensions for respirable fibers (note R in 97/96/EC) Nextel fibers do not have to be classified as dangerous substances according this directive.

Furthermore, the Nextel ceramic fiber diameter of 7-13 microns puts them outside the World Health Organization (WHO) definition of respirable. Fibers are defined as respirable by WHO convention if the length is greater than 5 microns and the diameter is less than 3 microns with a length to diameter ratio greater than 3:1.

Local exhaust ventilation and/or use of NIOSH approved dust mist respirators is recommended for operations where fibers or dust may become airborne. If nose or throat irritation occurs, move to fresh air.

Eye and Skin Contact
3M Nextel 312, 440, 550, 610, and 720 Ceramic Fibers can cause mechanical irritation of the eyes and skin similar to that caused by fiberglass. Safety glasses or

goggles, gloves and long sleeved clothing with tight fitting cuffs are recommended to minimize eye and skin contact. Contaminated clothing should be laundered each day. If eye irritation occurs, flush eyes with water. If skin irritation occurs, wash the affected area with soap and water and change to fresh clothing.

Heat Cleaning/Treatment

Heat cleaning Nextel 312, 440, 550, 610, & 720 Ceramic Fibers to remove the polymeric sizings and finishes or heat treatment of Nextel 312 Ceramic Fibers generates thermal decomposition products which can be hazardous if inhaled at concentrations exceeding their recommended exposure limits. Carbon monoxide and formic acid are the predominant decomposition products. By controlling carbon monoxide concentrations to the ACGIH Threshold Limit Value of 25 ppm (8 hr TWA), other decomposition products should also be adequately controlled. Control of carbon monoxide levels may be most effectively achieved through the use of exhaust ventilation, for example an exhaust enclosure or hood. The ventilation system should provide a minimum capture velocity of 150 ft /min (45,72 m/min) and should not be subject to disturbances produced by cross drafts. See the Nextel 312, 440, 550, 610, and 720 Ceramic Fiber Heat Cleaning/Heat Treating Procedure Bulletins for detailed instructions.

After Service Considerations

Analyses of Nextel 312 Ceramic Fibers, either as manufactured or after use, has shown that neither free silica nor the cristobalite form of silica is present. The silica in the fibers is present in the form of mullite, which is a stable mixture of alumina and silica. This differentiates Nextel 312 Ceramic Fibers from some other refractory ceramic fibers which when repeatedly heated to very high temperatures, >2012°F (>1100°C), may be partially converted to a form of crystalline silica.

Refer to “Fiber & Dust Inhalation” Section of this bulletin for precautions and respirator recommendations when using Nextel Ceramic Fibers.