

# **Memorandum – Materials Engineering Study: *PEX, Nylon, PVC, Copper***

Attention: RMWB Planning and Development Department

*Prepared on 25 June 2020*

Due to the recent flooding downtown, questions have arisen regarding the suitability of certain materials to withstand temporary immersion in flood water without requiring replacement.

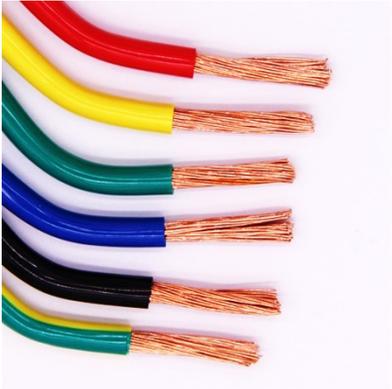
A careful examination of this document will answer these questions.

Please note that the scope of this document currently DOES NOT include an analysis of materials such as steel, whether galvanized or otherwise plated, painted, or bare, nor concrete, nor wooden structural members. It also does not include assemblies or equipment that include any constituent materials other than the four that are listed herein.

It is noted that the Authority Having Jurisdiction for the administration of the Alberta Safety Codes Act is the Regional Municipality of Wood Buffalo, not the Minister of Municipal Affairs or associated staff of that office. Therefore, it is expedient that the municipal administration be well-informed regarding the characteristics and uses of materials that were flooded in order that all residents of the municipality who were directly affected by the 2020 spring flood may be equally informed in their decision-making process as property owners insofar as they may consult the municipal administration during the course of repairing their properties.

**PEX**, or cross-linked polyethylene, is a toughened form of the world's most common plastic. It has a wide variety of uses, including for plumbing or sewage pipes, sheathing electrical conductors, protective foams, and even hip implants, due to its resistance to abrasion and impact, voltages, temperature extremes, and acidic or alkaline chemicals.

**Figure 1.** copper wires with PEX sheath



**Figure 2.** PEX protective foam packaging



**Figure 3.** PEX-sheathed spool of wire



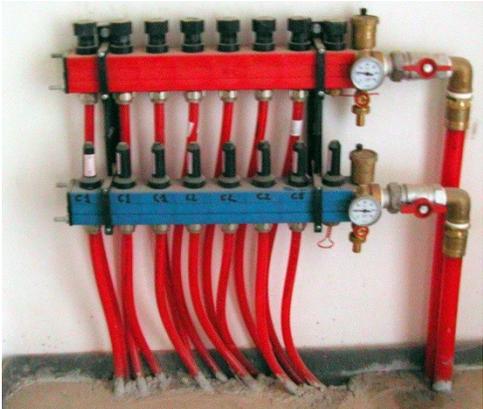
**Figure 4.** PEX chemical transfer hose



**Figure 5.** PEX sewage drain pipes

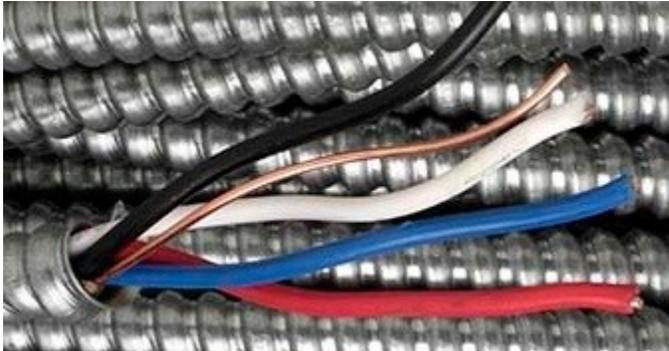


**Figure 6.** PEX piping of hydronic heating system

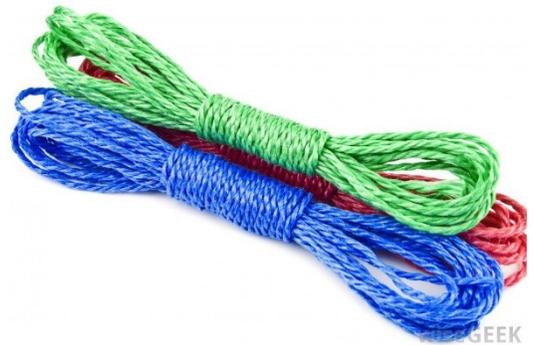


**Nylon** is a synthetic plastic polymer that is used for electrical cables, rope, and appliance or engine parts, due to its high resistance to heat, voltage, abrasion, fungus, and to chemicals such as water or gasoline.

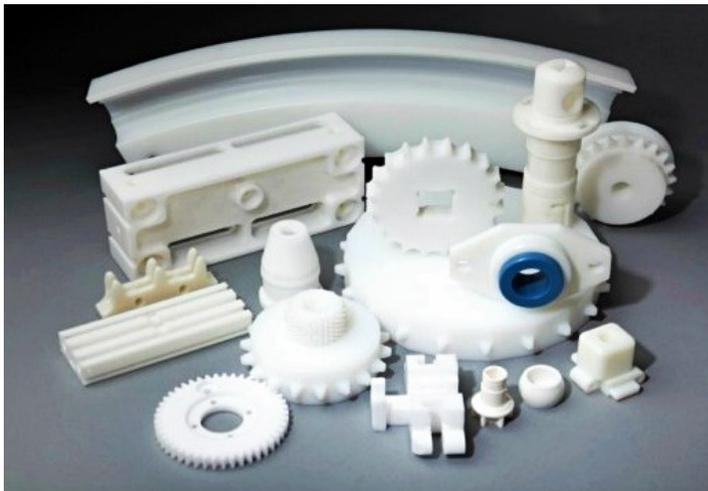
**Figure 7.** Armoured cable with Nylon-sheathed conductors



**Figure 8.** Nylon rope



**Figure 9.** Nylon precision engine and appliance parts



**PVC**, or polyvinyl chloride, is a synthetic plastic polymer that has many common and diverse uses: electrical cables and conduits, sewage pipes, windows and siding, because it is chemically resistant to acids, bases, salts, fats, and alcohols.

**Figure 10.** PVC Electrical Conduit



**Figure 11.** PVC-sheathed armoured cable on a spool



**Figure 12.** PVC Sewage pipe



**Figure 13.** PVC siding and window



**Copper** is one of the few metals that occurs naturally in readily usable form. It is thermally and electrically conductive, and has amazing antimicrobial properties due to the oligodynamic effect. It has many uses in every field.

**Figure 14.** Copper water pipes



**Figure 15.** Copper kettle



**Figure 16.** Copper cable with nylon and PVC sheathing



**Figure 17.** Bronze-plated coin (88% copper)

