



A unique solution for fighting forest fires around the world

Finnish companies PPO-Elektroniikka Oy and Kiilto Oy combined their expertise and developed a fluorine-free, halogen-free and water-saving firefighting chemical for extinguishing wildfires.



PPO® ForExt (patent P4954FI00) is a liquid forest fire extinguishing agent for extinguishing and controlling forest fires. This unique solution has a flame-retardant effect: it puts out the fire and prevents it from spreading.

Kiilto's 103-year expertise in the chemical industry and PPO-Elektroniikka's more than Thirty years of experience in fire extinguishing technology made it possible to develop this unique solution. [Kiilto Oy](#) is responsible for manufacturing the product and [PPO-Elektroniikka](#) is responsible for its marketing and development of the spreading technique.

PPO® ForExt stops the fire and prevents it from spreading. The substance is mixed with water at a mixing ratio of **1:100*** and first applied to the outer edges of the forest fire – the treated zone prevents the fire from spreading further both on the surface of the ground and inside the ground. After this, ForExt can be used for the actual extinguishing. ForExt was tested in several tests and in real action during the post-extinguishing of the Kalajoki forest fire in 2021, where it proved its functionality – the treated areas did not ignite again.

The ForExt/water mixture can be spread from any existing firefighting equipment, such as helicopters, aeroplanes, fire trucks or special equipment designed for forest fires.

The Rescue Service of South Savo tested the mixture in the summer of 2021 and found that it works excellently without clogging water cannons, shower pipes, pumps, and even the tiniest ones.

****Carefully read the operating instructions and pay attention to the conditions in the area to be extinguished. Higher mixing ratios (2-5%) enhances extinguishing power due to terrain formation, vegetation and weather conditions.***



PPO® ForExt is a halogen- and fluorine-free agent. ForExt is not classified as hazardous to humans or the environment according to chemical legislation (CLP Regulation No. 1272/2008 EC). According to the Safety Statement, ForExt is not classified as hazardous in any hazard category under the Globally Harmonized System (GHS). ForExt is safe when used according to instructions.

PPO® ForExt effectively prevents the spread of fire

Extinguishing forest/wildfires is a very demanding task. The area can be challenging to access and dangerous; it requires a lot of equipment and firefighters 24/7 to control and extinguish the fire. Fires can last for several weeks.

PPO® ForExt is easy to spread, and it quickly brings help to the fire area. The ForExt agent is mixed with water (Ratio 1:100).



Picture: Hay fire extinguishing test. The fire stopped entirely at the edges of the treated area.

Watch the Hay fire test video on YouTube: https://www.youtube.com/watch?v=eFZ_QbzZSpg.

Tests in Niinisalo, Finland

10 July 2023

We tested the functionality of the PPO® ForExt in the Niinisalo garrison, Finland. Thanks to the teams of the Rescue Services of Satakunta and Pori Brigade.

Half of the area was treated with pure water and half with ForExt/water mixture 1:100. The weather was dry and hot; it hadn't rained in a few weeks. We waited half an hour before lighting the fire. The water had evaporated, so the fire advanced at full speed in the water-treated area. When the fire reached the area treated with the ForExt/water mixture, the fire was put out immediately.



Watch the video on YouTube: <https://www.youtube.com/watch?v=JRf3sL9SmG4>.

Tests in Vekarajärvi, Karelia Brigade, Finland

31 May 2022

[The South Savo Rescue Department](#) and the [Karelian Brigade/The Finnish Defence Forces](#) organised a test day for PPO® ForExt in Vekarajärvi. During the day, the substance was tested in different ways, with smaller hand sprayers and heavier

equipment, such as fire equipment developed in cooperation between the Rescue service and the forest machine company Ponsse Oy (Called [Mörkö](#) in Finnish).

The test sessions were part of the Ministry of the Interior's Rescue Department's project "Development of an operating model for a special resource for wildfire firefighting operations". The tests will also be used in international cooperation (The Finn Rescue Arctic Ground Forest Firefighting Using Vehicles ([FI GFFF-V FI GFFF-V](#)) project aims to develop the extinguishing performance of wildfires locally, regionally, nationally as well as internationally.

Preliminary findings in Vekarajärvi

According to all the experts on-site, the user experience was excellent. The mixture was easy to apply, not clogging even the tiniest nozzles.

ForExt was applied and mixed with water in a limited area. The firefighters lighted a fire in a large pile of twigs. The fire subsided quickly and did not spread from the treated area.



The mixture was applied to a confined area with a hand sprayer and heavier equipment.



The fire was lit in a dry, giant pile of twigs.



The fire did not spread from the treated area – it quickly subsided.

Watch the video on YouTube: <https://www.youtube.com/watch?v=MdEOLCxxoLY>.

Firefighter experts on Twitter (X) after the test day

https://twitter.com/mika_siitonen

Mika Siitonen, Fire Chief, Etelä-Savo Rescue Department, Mäntyharju fire station #GFFF-V.



In English: Rainy weather slightly disturbed @karjalanPR and @escue firefighting. Test with a forest fire extinguisher # forest fire. It seems very promising; we will develop tactics with fire equipment (Ponsse ´s wagon). # GFFF-V

Mika Siitonen @mika_siitonen · May 31
@RikuHmlinen1 esitteli sammutusrepun sammutustehoa samalla aineella. Hyvä apu pienessä tilanteessa sekä tilanteen alussa / pitkän letkunvetomatkan päässä olevassa kohteessa. Antaa aikaa letkunvedolle.



In English:

One firefighter presented the extinguishing effect of a fire-extinguishing backpack with the ForExt-water mixture, which gave time for hose pulling.

PPO® ForExt was tested in the Kalajoki forest fire

29-30 July 2021

PPO® ForExt was tested for the first time in an actual situation during the post-extinguishing phase of the massive forest fire in Kalajoki in July 2021.

The Rescue Director called and asked for help extinguishing a challenging forest fire. The PPO team loaded its van with the PPO ForExt extinguishing agent and headed toward Kalajoki. The biggest problem was the peat-based land, which repeatedly caught fire.

The fire brigade had already pumped 100,000 litres of pure water into the hectare area, but the fire always broke out again.

The PPO team treated three hectares with a ForExt/water mixture (10,000 litres of water / 100 litres of ForExt). The treated area never caught fire again.

Forext kept the treated area non-flammable for a long time. The water delivered to the site could be sprayed at full pressure approximately 50 meters away on both sides of the machine, resulting in a fire break covering approximately one hundred meters at a time. Experiences of ForExt's functionality in an actual fire were excellent.

The Kalajoki forest fire was Finland's largest in more than 50 years. The burned forest area was about 227 hectares in total.

The picture shows the application of PPO® ForExt/water mixture during post-extinguishing forest fires in Kalajoki.



ForExt is mentioned in the report of the Ministry of the Interior:

Mänttäri Joni. [Formation of the concept of ground extinguishing operations for wildfires in the rescue operation.Southern Karelia Rescue Department.](#) Publications of the Ministry of the Interior 2022:17. Page 34 3.9.4 Flame retardants.

Tests in South Savo, Finland

9 June 2021

We tested the substance's spreadability in tests organised by the Etelä-Savo rescue service in Mikkeli. The test was part of the Ministry of the Interior's rescue department's project "Development of the operational model of the special resource for land fire extinguishing."



Picture: The test day in Mikkeli, Finland

Tests showed that PPO® ForExt mixed with water could be used with all existing equipment. The application of the mixture works excellently in cannons, shower pipes, pumps and other devices in use without clogging them.

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The PPO® ForExt Firestop



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[PPO® ForExt Video 2:27 sec](#) (Youtube)



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