

**STOP FOREST FIRES
FROM SPREADING**



by **PPO®**

ForExt

Forest Fire Extinguishing Agent

**Fluorine-free – Halogen-free – Free of heavy metals
Saves water – Cost-effective**



MADE IN FINLAND





PPO® ForExt is safe to use

PPO® ForExt is not classified as dangerous for humans or the environment, according to chemical legislation (CLP Regulation No 1272/2008 EC).

The components are classified as non-hazardous under the Globally Harmonized System (GHS).

The Safety Statement: Safe to use

- **Fluorine-free**
- **Halogen-free**
- **Free of heavy metals**
- **Mixed with water 1:00 (in challenging circumstances 2-5:100)**

PPO



KiilTO



The world needs new methods for wildfire fighting – the old ones do not work

The problem is...

- Spraying pure water in the burning forest is not enough.
- At a temperature of +30°C, the sprayed water will evaporate within 5 minutes.
- Airdrops are expensive and ineffective.
- When several fires co-occur, not enough airplanes or copters are available.
- Not enough firefighters and equipment
- No water available



How the story of PPO® ForExt began

PPO -Elektroniikka has been in the firefighting and fire safety business for over 30 years.

At the beginning of the '90s

The Finnish wildfire-fighting chemical we delivered was used for over 15 years in Finland, though it was known to have potentially harmful properties and was so thick that it could only be dropped from aircraft. According to the situation, reasonable use was assessed when the benefits outweighed the disadvantages.

Entering a new stage 2019

We started to develop a fluorine- and halogen-free agent, aiming for harmless substances to humans, nature, animals, and groundwater.

We also wanted to get the viscosity close to the water so we could spray it with all existing fire tools.

We joined forces with the Finnish **Kiilto**, an over 100-year-old chemical manufacturer in Finland operating worldwide - known for its commitment to environmental responsibility and circular economy.

We succeeded – ForExt was born.



An innovative, green method of fire fighting

Dropping water in the burning forest is not efficient

- The 1200 -1300 degrees Celsius heat makes water steam away, and only 2-3 % reaches the ground.
- A helicopter hour in airdrop costs 20,000 Euros /h, and a big aircraft 100 000 -200 000 Euros/h. A helicopter can make 2-3 water drops in an hour, dropping 2,000 – 6,000 litres in one hour, of which a few hundred litres reach the ground. Airdrop into a burning forest looks good, but it is more of a show than actual firefighting.
- If the area is difficult to access and the only option is to extinguish the forest fire by airdrop, the most effective method is to create a firestop using a ForExt water mixture.
- **Our strategy** is to use the ForExt mixture to create the **ForExt firestop area**. We do not spray in the fire; we create an area where the fire stops.
- With one tank of forest trailer, we can treat a 1-2 hectares area which will not catch fire in 12-24 hours.
- Usually, when you have succeeded in stopping the fire from going further, it makes no sense to try extinguishing the area on fire, as a burned and half-burned forest has no commercial value.



The PPO® ForExt fire stop



*This area
handled with*



by PPO®

ForExt

Forest Fire Extinguishing Agent

*The area where
fire stops*

A growing forest fire



How ForExt works

- First, ForExt-water mixture is applied to the outer edges of the forest fire to create the fire stop area. The treated zone prevents the fire from spreading further on the ground's surface and inside. After this, ForExt can be used for the actual extinguishing.
- When sprayed to the surface, ForExt-mixture goes deeper into the surface than pure water.
- ForExt keeps the treated area moist for a long time. Therefore, the treated area does not catch fire for 12-24 hours.
- With the use of forest trailers, ForExt goes even deeper into the ground.



Advantages – PPO® ForExt

- Environmentally-free solution, no fluorine, no halogens, no heavy metals.
- Same velocity as water - does not clog even the most miniature nozzles.
- Stops the fire from spreading. Very efficient in the post-extinguishing.
- Releases the fire staff and equipment to the next fire area.
- Firefighters' safety – fire releases poisonous gases >
The water-ForExt mixture is spread outside the fire zone, creating a wide enough fire break area so firefighters are not exposed to toxic gases.
- Stops the fire and enables it to be directed away from buildings and other property - saves lives. Efficient extinguishing – saves water.
- Burning objects will not ignite a new fire when they fall onto the treated area.



PPO® ForExt with extinguishing wagons

Suitable for all existing extinguishing equipment.

Extinguishing wagons with PPO® ForExt is the most effective solution in challenging conditions.

We cooperate with Finnish forest machinery companies [Kesla Oyj](#) and [Ponsse Oyj](#).





PPO® ForExt

- Extinguishing efficiency proven:
Kalajoki forest fire, Finland, 7/2021
- The fire-fighters biggest challenge was that the beat-based ground reignited, again and again, when they used only water.
- ForExt stopped the reignitions.





PPO® ForExt mentioned in Finnish Ministry of Interior report

Translation from Finnish:

“Different fire retardants have been developed to extinguish wildfires effectively. Fire retardants can be used to enhance the extinguishing effect, or they can be used to create fire breaks to prevent the fire from spreading. In Finland, there are environmentally friendly fire extinguishing agents that do not cause damage to the terrain, people or animals, nor damage the extinguishing equipment.

Fire retardants can be used as an enhancement in traditional extinguishing tasks. They can be mixed with the water tanks of fire engines and spread with a water cannon or spray pipe on the fire area or its edges. Fire retardants can also be used with helicopters.

For example, in the Kalajoki forest fire, the ForExt chemical was used with the extinguishing wagon, which made a fire break of about 100 meters at once. The area treated with fire retardant did not catch fire again. This extinguishing trailer was developed for forest machines in cooperation between the Rescue service and the Forest Machine Company Ponsse Oy.”

Source: *Sisäministeriö Helsinki 2022. LIITE 9a (Sisäministeriön julkaisuja 2022:17). Maastopalojen maasammutustoiminnan konseptin muodostaminen pelastustoimessa. Laaja raportti. Joni Mänttäre, Etelä-Karjalan pelastuslaitos. (Source In English: The Ministry of the Interior Helsinki 2022. APPENDIX 9a (Publications of the Ministry of the Interior 2022:17). Formation of the concept of ground extinguishing operations for wildfires in the rescue operation. Extensive report. Joni Mänttäre, South Karelia rescue service. Pages 34-35.)*



Application of the ForExt-water mixture



Tests with the South Savo Rescue Department in Mikkeli, Finland, June 2021.



PPO® ForExt sprayed from the helicopter and new firefighting equipment (installed in the load space of a forwarder for extinguishing wildfires).



Extinguishing test in Niinisalo Brigade area, Finland, June 2023



Applying the ForExt-water mixture to the test areas.



The fire is spreading quickly in the untreated area.



The spread of the fire stops at the edge of the area where the ForExt water mixture has been applied.





Extinguishing test in Vekarajärvi, Finland, May 2022



•**Organisers:** The South Savo Rescue Department and the Karelian Brigade / The Finnish Defence Forces

• The test session was 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".

•**Test results:** According to all the experts on-site, the user experience was excellent: The mixture was easy to apply, not clogging even the tiny nozzles. The fire did not spread from the treated area – it quickly subsided.





PPO® ForExt tested globally

Cooperation with the Business Finland Colombia and Coinsa S.A.S started in the beginning of 2024.

Tests conducted in Bogota, Colombia, on February 14, 2024 with Business Finland, Policía Metropolitana de Bogotá, Coinsa S.A.S, PPO-Elektroniikka LTD

Test result: demonstrated ForExt's effectiveness in containing forest fires.



Also tested in Australia, Greece, UK, Netherlands, Canada, Portugal



Product Safety Assessment

An impartial specialist in chemical evaluation examined ForExt's ingredients.

According to the Safety Statement, **ForExt is safe to use** in terms of composition.*

Special caution must always be observed in forest fire extinguishing operations.

*Safety Data Sheet T2486, PPO® ForExt Forest Fire Extinguishing Agent



STATEMENT

Product Safety Assessment

Product: PPO® ForExt forest fire extinguishing agent
Manufacturer: PPO-Elektroniikka Oy
Use: Fire Extinguishing Agent
Scope: Safety with respect to the environment and to human health is assessed

Assessment outcome

The components of which the product ForExt is composed are well known substances in use in many different applications and industries. The components are classified under the Globally Harmonized System (GHS) as non-hazardous. Based on the compiled toxicity data of the raw materials and on information provided by the manufacturer there are no particular concern regarding the use of the product for the purpose assessed.

The product is concluded to be safe for use under normal and reasonably foreseeable conditions of use.

April 23, 2024



Jan Nylund, PhD
Senior Safety Expert



For various applications

- Industrial use – Hot work such as welding, grinding, etc.
- Military use - Shooting exercises
The Finnish Defence Forces have found tens of applications. where they will use it in the future, practice shootings, protecting temporary bullet storage, etc. In cannon shooting, they treat the target area with the PPO® ForExt.
- Protecting residential areas - Properties, yards, gardens
- Camping - Extinguishing campfires
For example, 65% of wildfires in Canada have started from camping fires.



In 2025, cooperation with Caylym, USA: The Guardian™ system with ForExt



What sets the Guardian apart:

- Easy adaptability
- Compatible with any rear-loading aircraft, no modifications required.
- Only requires two people to set up and fill
- Tested with highest standards of emergency takeoff and landing
- Falls below and behind aircraft so no payload touches aircraft
- Would allow thousands more aircrafts to fight wildfire day and night





Why PPO® ForExt?

- Forest fires and wildfires are a serious global threat.
- Extinguishing wildfires is a very demanding task. The area can be hard-to-reach and dangerous, requiring a large team of fire professionals 24/7 to control and shut down the fire. The fire can last up to weeks, even months.
- That is why we developed an environmentally friendly extinguishing agent PPO® ForExt, that is easy to apply and brings help to the fire area immediately.



PPO® ForExt

PPO
Elektroniikka

KiilTO

An innovative solution for fighting wild and forest fires around the world.

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