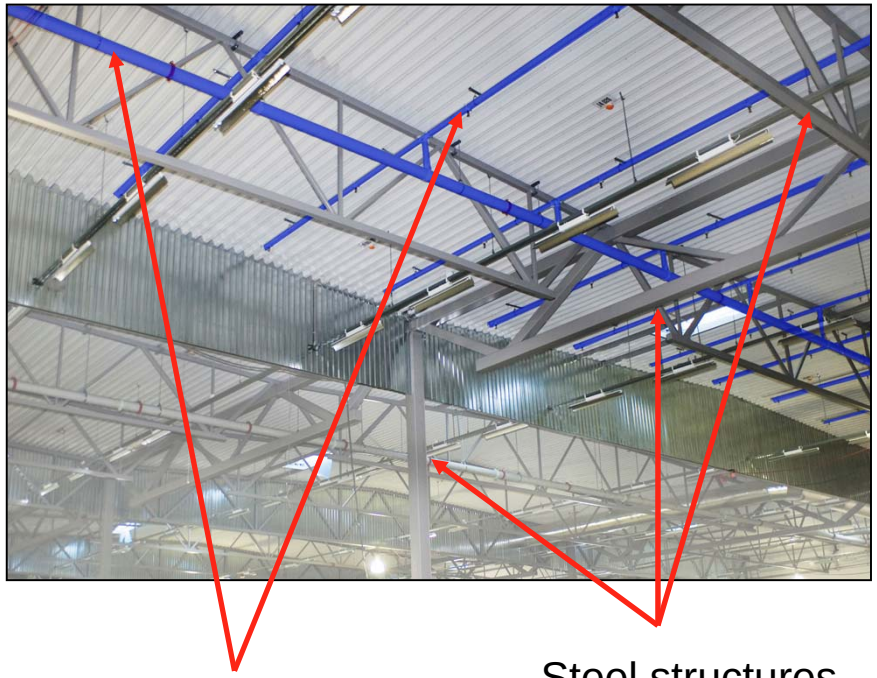
Fire protection of steel structures using automatic water extinguishing system

Dr. Jyri Outinen, Ruukki Construction

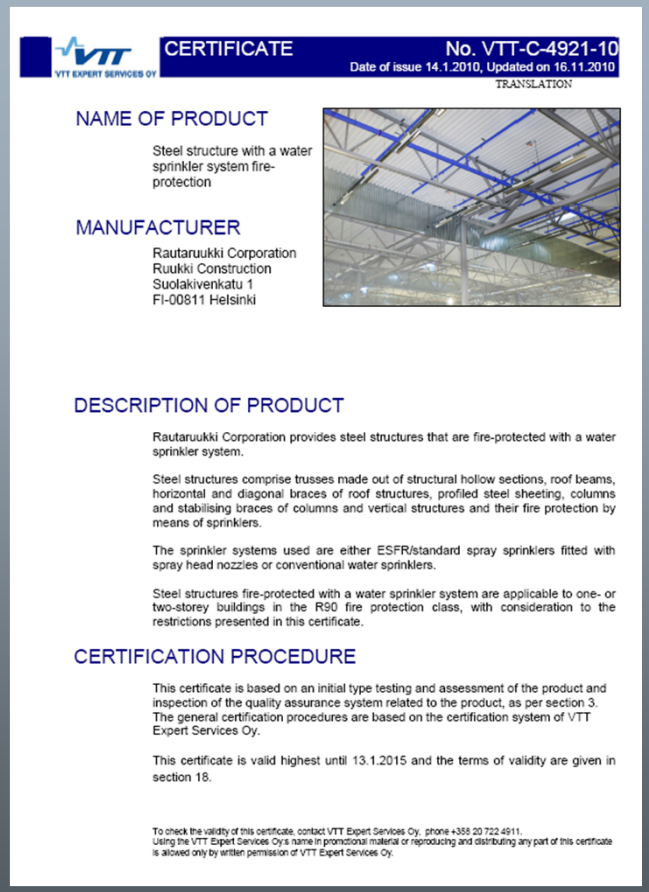
- The system consists of a sprinkler system integrated to Ruukki's frame
- Gives protection to trusses, beams, and bracing and also to columns
- Spacing of the piping is fitted to the module of the frame spacing
- The systems cools down the structures so, that:
  - Up to 60 minutes fire protection, all the steel structures' temperatures stay below 350 °C and
  - Up to 90 minutes
    - The temperatures of trusses stay below 400 °C and the profiled steel sheeting under 450 °C with water flow 12.5 mm/min and
    - The temperatures of trusses stay below 450°C and the profiled steel sheeting under 470°C with water flow 10 mm/min.



Sprinkler piping and nozzles (BLUE)

Steel structures, trusses, beams, bracing, columns (GREY)

Certificate – VTT-C-4921-10



VTT EXPERT SERVICES OY

CERTIFICATE

No. VTT-C-4921-10

Date of issue 14.1.2010, Updated on 16.11.2010

TRANSLATION

NAME OF PRODUCT

Steel structure with a water sprinkler system fire-protection

MANUFACTURER

Rautaruukki Corporation
Ruukki Construction
Suolakivenkatu 1
FI-00811 Helsinki

DESCRIPTION OF PRODUCT

Rautaruukki Corporation provides steel structures that are fire-protected with a water sprinkler system.

Steel structures comprise trusses made out of structural hollow sections, roof beams, horizontal and diagonal braces of roof structures, profiled steel sheeting, columns and stabilising braces of columns and vertical structures and their fire protection by means of sprinklers.

The sprinkler systems used are either ESFR/standard spray sprinklers fitted with spray head nozzles or conventional water sprinklers.

Steel structures fire-protected with a water sprinkler system are applicable to one- or two-storey buildings in the R90 fire protection class, with consideration to the restrictions presented in this certificate.

CERTIFICATION PROCEDURE

This certificate is based on an initial type testing and assessment of the product and inspection of the quality assurance system related to the product, as per section 3. The general certification procedures are based on the certification system of VTT Expert Services Oy.

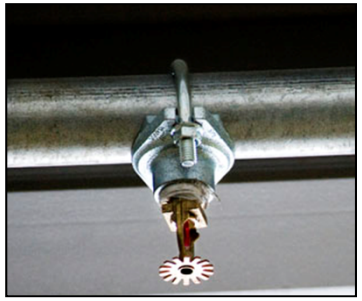
This certificate is valid highest until 13.1.2015 and the terms of validity are given in section 18.

Click to view the certificate

- National product approval, VTT certificate.
- Finnish / English
- ETA approval (CE-mark) is applied, and the process is continuing
- Provides structural fire protection to steel structures in
  - 1-2 storey buildings
  - Fire protection up to 90 minutes,

Fire protection of steel structures using automatic water extinguishing system

- Based on testing and further simulations carried out by research institutes VTT and TUT
- Sprinkler nozzles:
  - ESFR (Early Suppression Fast Response)
  - Spray-sprinklers
  - Conventional sprinklers
- The temperatures of structures stay at safe level
- No need for additional fire protection



Sprinkler installation

ESFR

Conventional

Spray

Fire protection of steel structures using automatic water extinguishing system

- Instructions to structures and sprinkler system are given in the Certificate
- Design of the system is done in co-operation with structural and sprinkler designers
- The final design is inspected by Ruukki or 3rd party
- CE-marking (ETA-approval) is applied
- The sprinkler design and installation follows CEA 4001

Shopping center 60 000m^2 protected by Ruukki sprinkler system