

7 Outstanding Features →

The PLUS7 fuel has seven outstanding benefits against the existing KSNP type fuel, which include thermal margin increase of greater than 10% in power, high burnup capability of 55,000 MWD/MTU(Batch Average), neutron economy enhancement, seismic resistance improvement, reduced fretting wear susceptibility, enhanced debris filtering efficiency and increased fuel productivity.

01 Enhancing Thermal Margin

The mixing vanes with high thermal performance have been newly introduced to all mid-grids with a relatively small pressure increase. The CHF tests showed thermal margin increase of greater than 10% in power.

02 Achieving High Burnup Capability

To achieve high burnup capability of 55,000MWD/MTU(Batch Average), the dimensions of the fuel assembly and the fuel rod have been optimized and an advanced Zr-Nb alloy has been selected. The extensive fuel performance analyses indicate that the PLUS7 fuel will meet the target burnup.

03 Improving Neutron Economy

Neutron economy has been increased with the introduction of axial blankets at both ends of the pellet region and optimized fuel rod diameter.

04 Improving Seismic Resistance

The mid-grid buckling strength has been increased using straight grid straps and optimizing grid height, which will allow the PLUS7 fuel to maintain integrity even under severe seismic-related accidents.

05 Reducing Grid-to-Rod Fretting Wear Susceptibility

The mid-grid spring and dimple have conformed shapes to increase contact area between fuel rod and spring /dimple, which will reduce fretting wear susceptibility

06 Increasing Debris Filtering Efficiency

The protective grid is used in conjunction with small hole/slot bottom nozzle to filter debris efficiently as well as to support fuel rod against fretting wear-induced fuel failure.

07 Improving Fuel Productivity

The grid-to-guide thimble has been connected by spot welding in air rather than TIG welding in the chamber used in the current fuel. This is found to result in the dramatic reduction of fuel assembling time.

PLUS7TM

*Advanced Fuel for
OPR1000/APR1400 Plants*

KEPCO NF's PLUS7-fuel, designed to replace CE type 16 x16 fuel, has been improved to meet the enhanced performance needs of utilities for future use. The PLUS7 is fully compatible with reactor internals, handling equipments, other core components and resident fuels.



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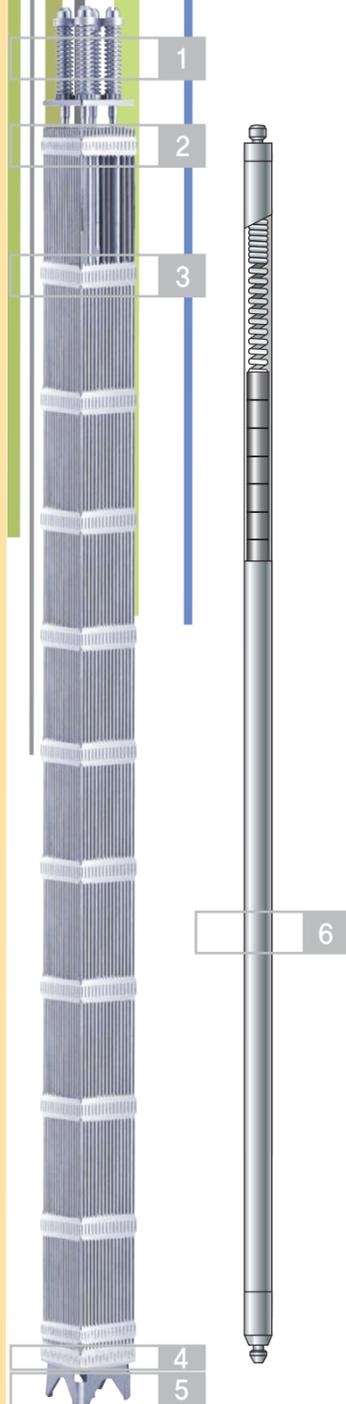
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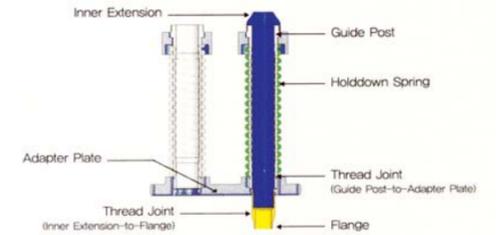


- 01 | Reconstitutable Top Nozzle
- 02 | High Burnup Inconel Grid
- 03 | Mixing Vaned Mid Grid
- 04 | Protective Grid for Debris Filtering
- 05 | Debris Filtering Bottom Nozzle
- 06 | High Burnup Fuel Rod



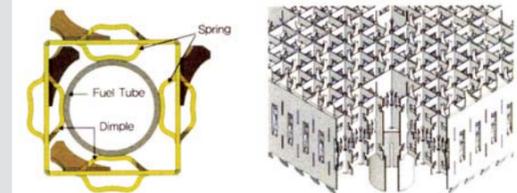
Outer Post/Inner Extension/Guide Thimble

- Easy Reconstitutable Top Nozzle
- Guide post, holddown spring and adapter plate remains as an one piece after reconstitution
- Detach the nozzle with unlocking inner extension from guide thimble flange only



Conformal Mid Grid

- Increased Fretting Wear Margin
- Total of 6 conformal type contact geometries give large contact area that improves fretting wear resistance capability



Improved Debris Filtering Capability

- Features in PLUS7 fuel provide multi-protection against debris-induced fuel rod damage.
- Debris-filter bottom nozzle(DFBN) traps most debris before it enters the assembly.
- The next line of defense is provided by solid end plugs and a protective grid located directly above the DFBN.

