



# WESTERN STATES

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## QUADRAMATIC™: TECHNICAL SPECIFICATIONS, CENTRIFUGAL PURGING AND WASHING, AND PRINCIPLES OF OPERATION

### Technical Specifications:

| MODEL                                  | Q-068 | Q-120 | Q-210 | Q-250 | Q-320 | Q-520 |
|--|-------|-------|-------|-------|-------|-------|
| Volumetric Capacity (ft <sup>3</sup> ) | 1.9   | 3.5   | 8.9   | 12.5  | 15.7  | 33.3  |
| Volumetric Capacity (liters)           | 54    | 99    | 252   | 354   | 445   | 943   |
| Filter Surface Area (ft <sup>2</sup> ) | 6.8   | 11.8  | 20.9  | 25.12 | 31.4  | 52    |
| Basket RPM                             | 1560  | 1450  | 1250  | 1150  | 1150  | 1000  |
| Standard "G" Force                     | 900   | 900   | 900   | 900   | 900   | 850   |
| HP (minimum)                           | 10    | 15    | 20    | 30    | 40    | 50    |
| HP (maximum)                           | 15    | 20    | 30    | 50    | 100   | 200   |

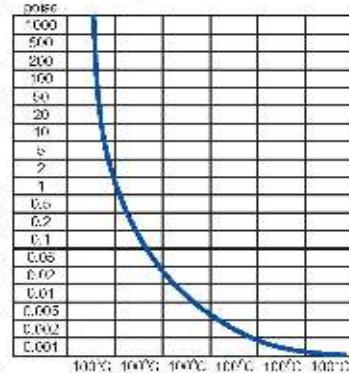
### DIMENSIONS

|                            |    |    |    |    |    |     |
|----------------------------|----|----|----|----|----|-----|
| Basket Diameter (in)       | 26 | 30 | 40 | 48 | 48 | 60  |
| Basket Depth (in)          | 12 | 18 | 24 | 24 | 30 | 40  |
| Basket Cap Width (in)      | 4  | 4  | 6  | 7  | 7  | 9   |
| Length (in)                | 52 | 60 | 80 | 96 | 96 | 120 |
| Width (in)                 | 47 | 54 | 72 | 86 | 86 | 108 |
| Height (Closed Cover) (in) | 44 | 51 | 68 | 81 | 81 | 101 |



## Centrifugal Purging and Washing

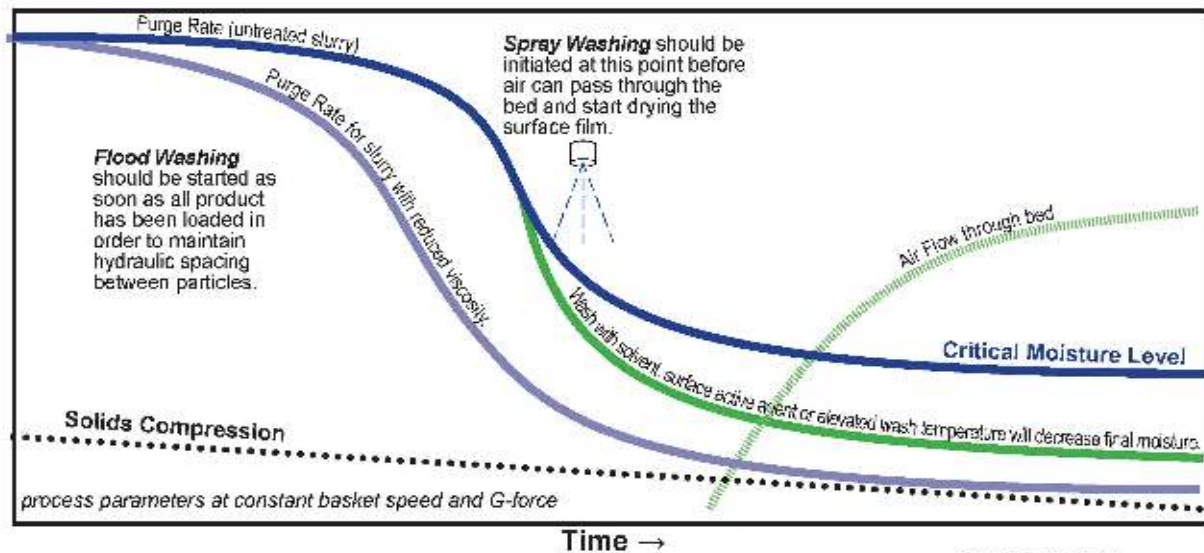
**Purge rate can be increased and final moisture level decreased** by reducing liquor viscosity by increasing temperature, dilution of mother liquor with a solvent or by the addition of a surface active agent. Most pure liquid viscosities drop by 1/2 with a 100°C increase in temperature (see graph at right). Complex mixtures with starches or polymers may be reduced in viscosity a similar amount with only 10°C temperature increase. Reducing viscosity by a factor of X increase the filtering rate by and average of  $\sqrt{X}$ .



**Final moisture level** alone can be reduced by the addition of solvent, surface active agent or by elevating the temperature of the wash (either flood or spray) fluid. Making additions to the wash instead of the mother liquor has the advantage of conserving the solvent or additive and maintaining mother liquor purity.

**Spray Wash Timing** should take place as soon as the majority of mother liquor has purged. Attempting to wash after too long a period of centrifugal drying will likely be less efficient, due to the thickening or solidification of the surface film. A solidified film has less surface area available and stronger bonding forces to overcome than when it was in a fluid state. The amount of time required to dissolve a solidified film will be many times that of displacing an already solubilized film. An increase in fluid temperature will accelerate the process. Waiting too long to wash will be less efficient and waste wash fluid and possibly dissolve the desired solids.

**Flood Washing Timing and Rate:** Flood washing should be initiated as soon as the slurry is finished loading (i.e., early in the liquid purge stage as shown below) and before solids compression begins as a result of the loss of fluid between particles. The rate of addition of wash fluid must exceed the purge rate in order to create a flooding effect.



**Purging Phase**

**Decreasing Flow Rate**  
- Solids start to settle and compress, reducing permeability. Flood washing is best started at this point.

**Interstitial moisture removed** - only adhered, capillary and bound moisture remain. Spray washing is best applied at this point.

**Centrifugal Drying continues and Air Drying begins** after interstitial moisture and sufficient surface moisture is removed to create an open path for air through the cake.



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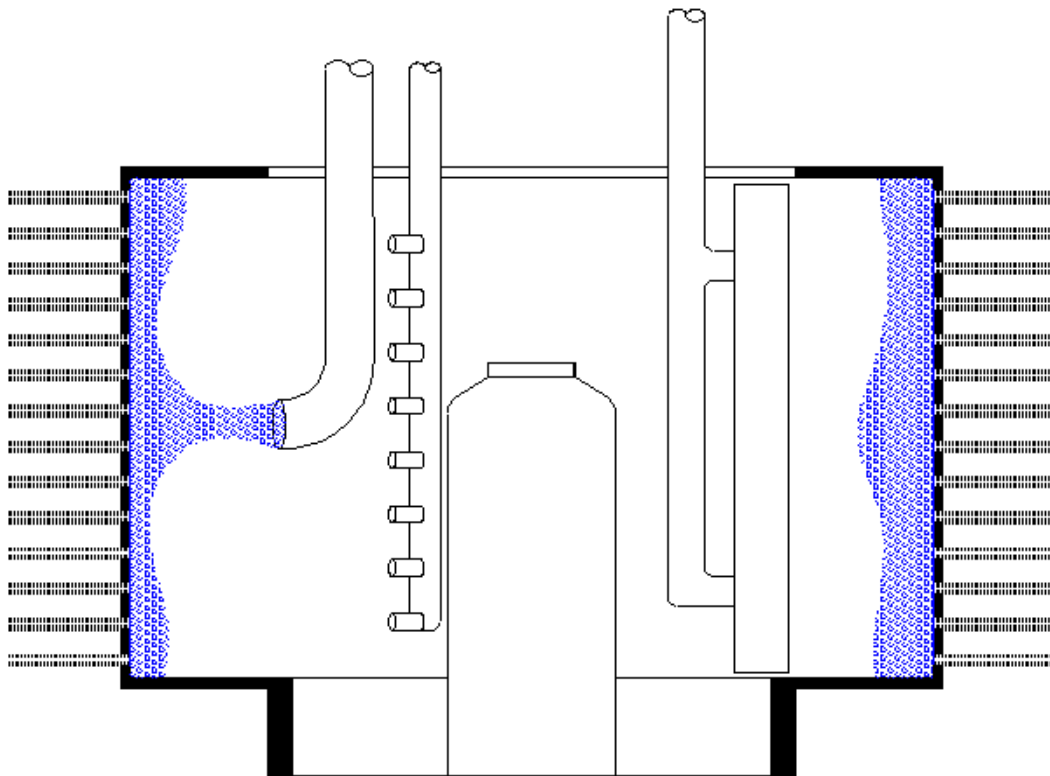


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## Principle of Operation of a Vertical Filtering Centrifuge

1. **LOADING** - The centrifuge accelerates to a predetermined loading speed and the flow of feed is initiated via the feed pipe. As centrifugal force drives the mother liquor through the deposited cake, filter media and perforated basket wall, a cake builds up on the filter media as the liquid effluent is discharged through a tangential outlet.





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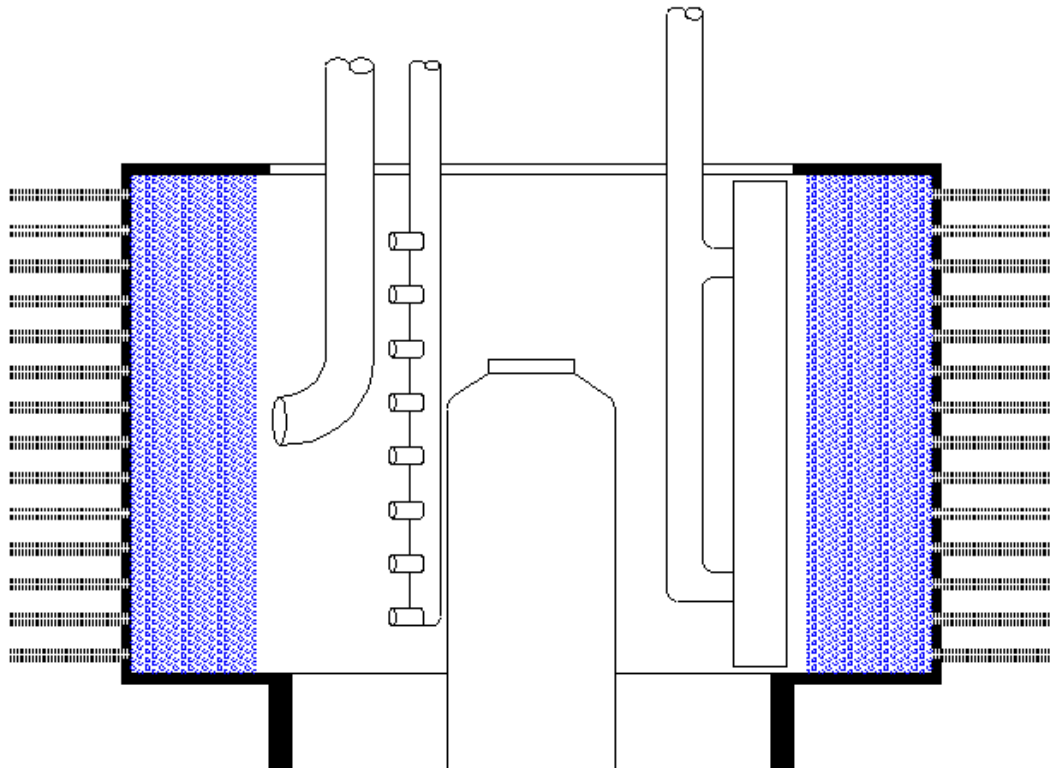
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2. **PURGING** - After the suspended solids have filled the basket to a preset volume or cake thickness, the cake detector provides the signal to shut off the feed and the retained solids are purged of mother liquor by accelerating the speed of the basket.





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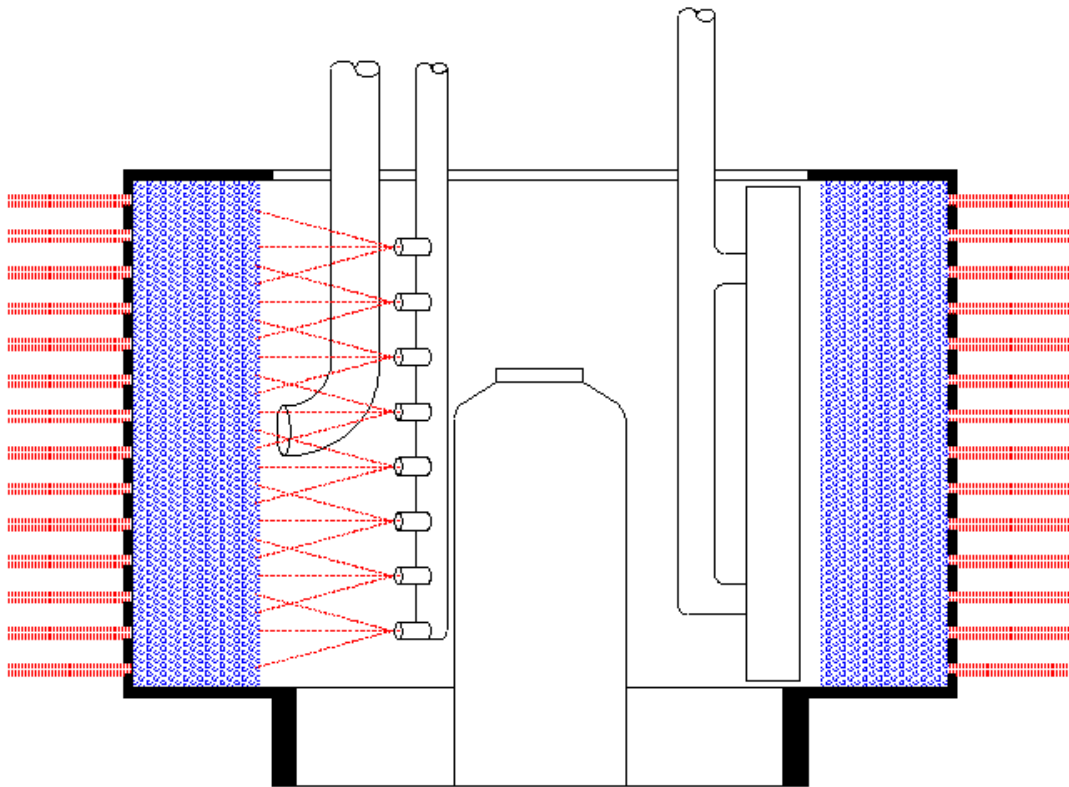
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3. **WASHING** - The wash liquid is applied to the product cake evenly via the wash pipe. Washing is generally initiated before the high speed is reached during purge. The retained solids are purged of mother liquor, washed and accelerated to spin drying speed.





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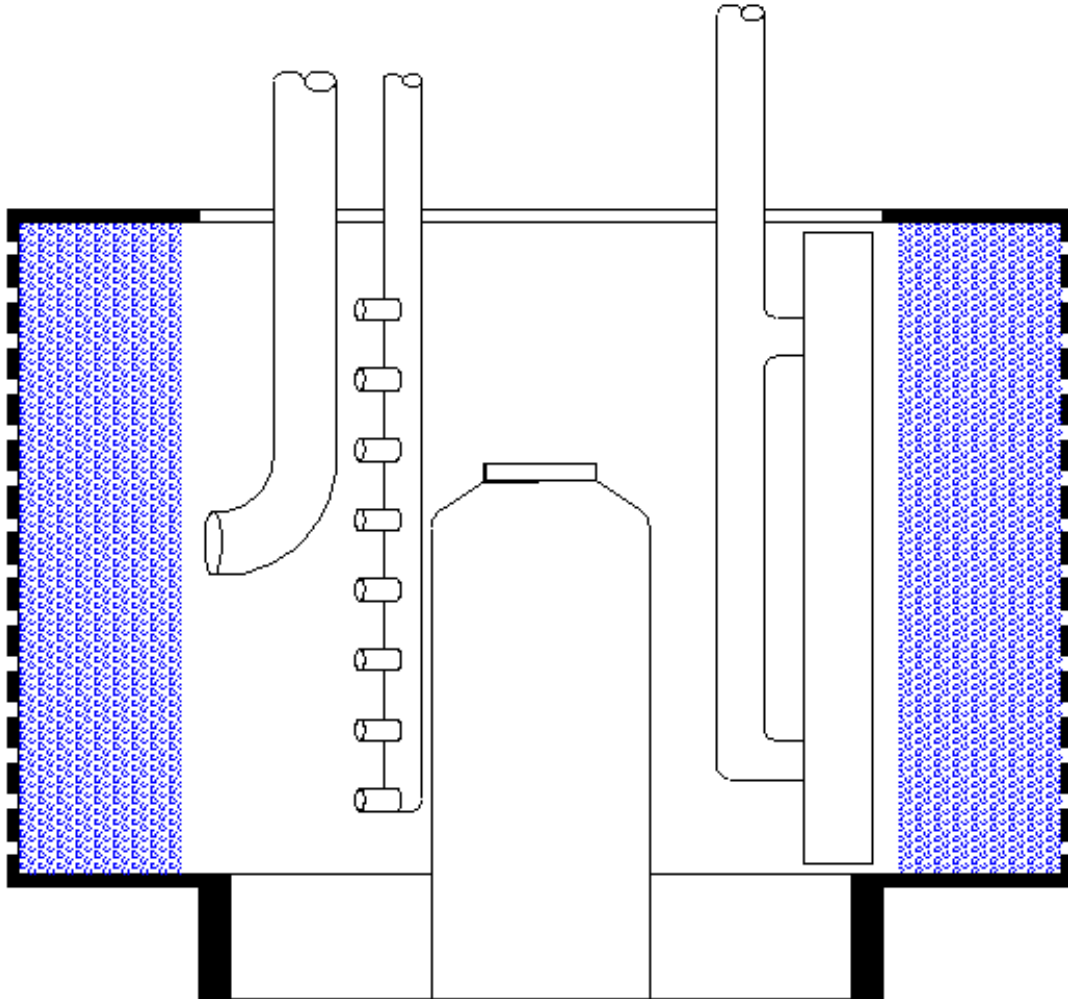
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4. **DRYING** - After washing, the basket speed is maintained at high speed until the desired level of moisture is obtained.





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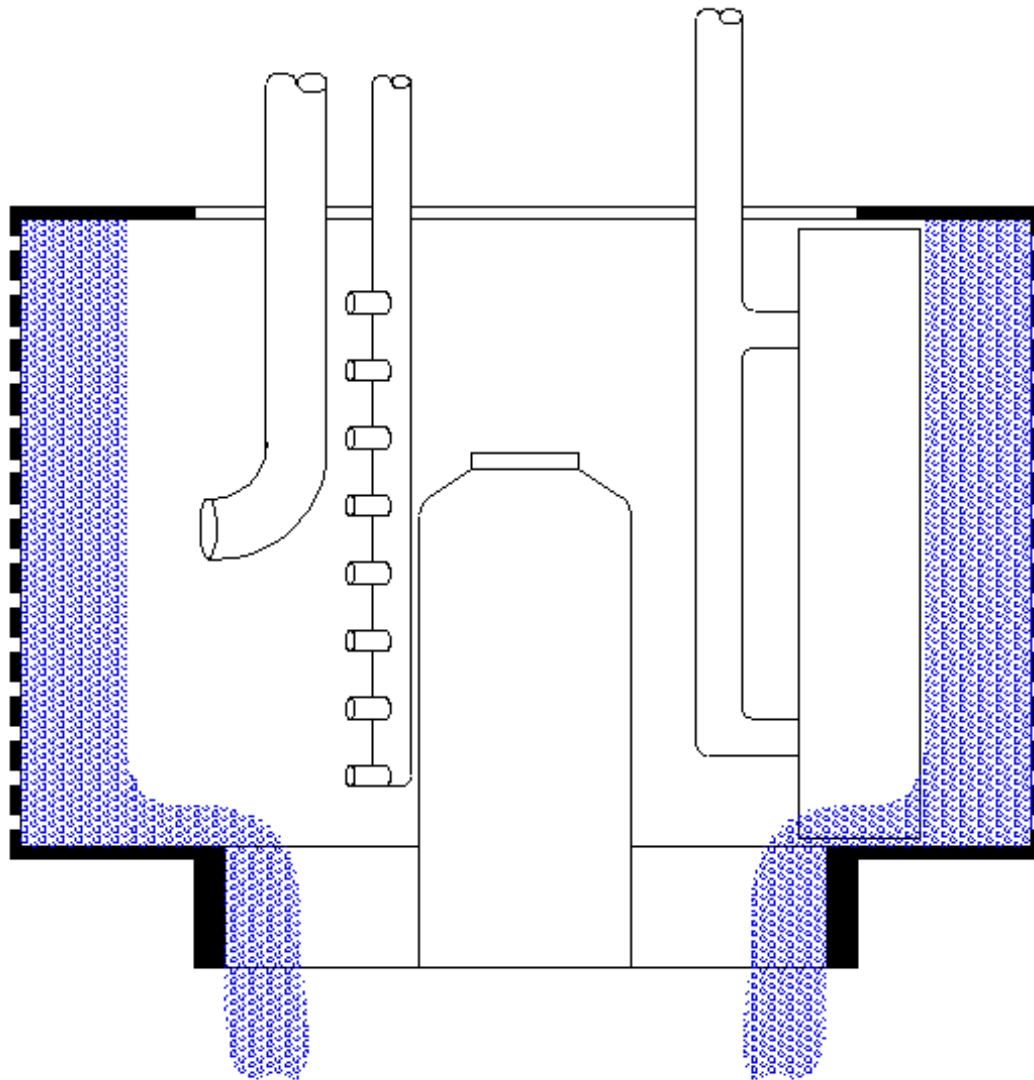
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5. **DISCHARGE** - The centrifuge decelerates to discharge speed and the discharge blade moves into the filter cake to remove the product from the basket. An alternative discharge method, not illustrated, allows top removal of product in a filter bag.





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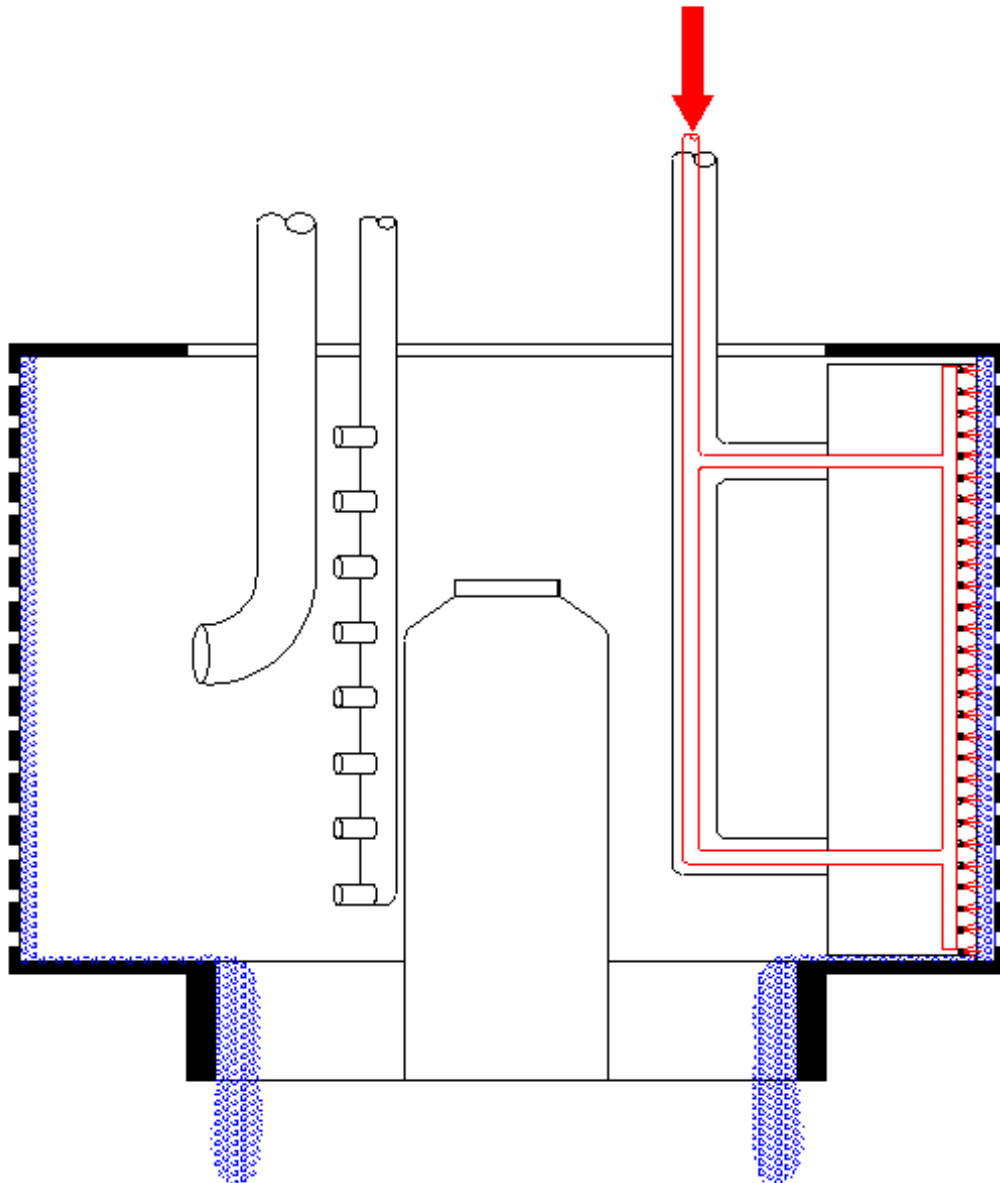
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- AIR KNIFE HEEL REMOVAL**- The residual heel of the filter cake is removed by using pressurized gas applied by nozzles on the discharge blade.







- BLOW BACK HEEL REMOVAL** – The residual heel of the filter cake can be alternatively removed by using pressurized gas applied by nozzles outside the basket.

