

Sumitomo's
New Distillation System
"Divided Wall Column"

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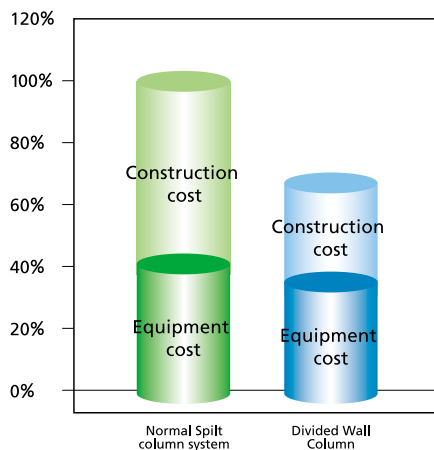
"Divided Wall Column," a long-cherished dream in the separation technology industry and what typifies the flow-intensive energy-saving system, has been realized in the form of Sumitomo's new distillation system called "Sumitomo Divided Wall Column."

Although multi-component distillation generally conducts separation by stacking a number of distillation columns, the running cost becomes high since heating and cooling are repeated in each of the said columns which increase utility usage. Moreover, the initial cost also increases because a number of distillation columns and auxiliary equipment must be produced and constructed. To solve such problems, we introduce "Sumitomo's new distillation system." This system has been developed by utilizing the distillation technology cultivated over the years based on "Sumitomo SFLOW® Packed Column," a structured packing column that is considered a major player in the field of separation technology. The abundant scale-up results achieved from the demonstration test using the pilot installation make this system highly reliable.

Initial Investment Cost Cut Compactness and Pipelessness

1. Approx. half in number of process and control equipment
2. Approx. half in process and utility pipe work
3. Minimization of equipment installation are required

Comparison by Actual Construction Costs



Comparative Example of the Facilities

	Normal Spilt column system	Divided Wall Column
Distillation column	2	1
Reboiler	2	1
Condenser	2	1
Pump	2	3
Facility space	100%	Approx. 60% of the Normal Spilt column system

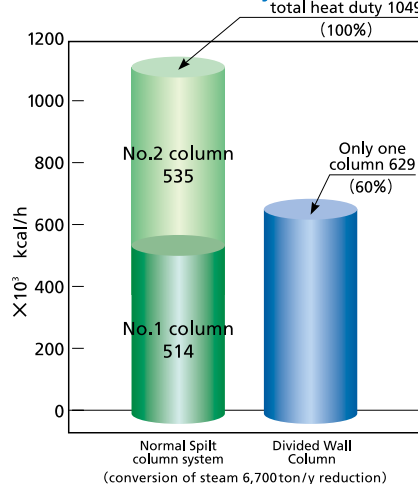
Operation Cost Economy Large Saving Energy

1. Approx. half of heating and cooling repetition frequency
2. Approx. half of maintenance fee for comprising machinery and instrument.

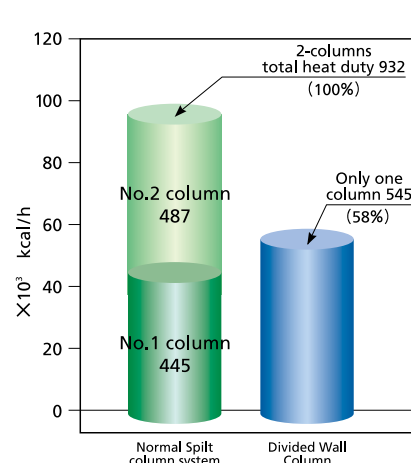
Comparison Using Actual High-Purity Ethyl Acetate Producing Process*

*●Amount of feed: 2,200kg/h ●Product purity: 99.99wt% ●Column diameter: 1,100mm ●Number of theoretical stages: 50

Reboiler heat duty



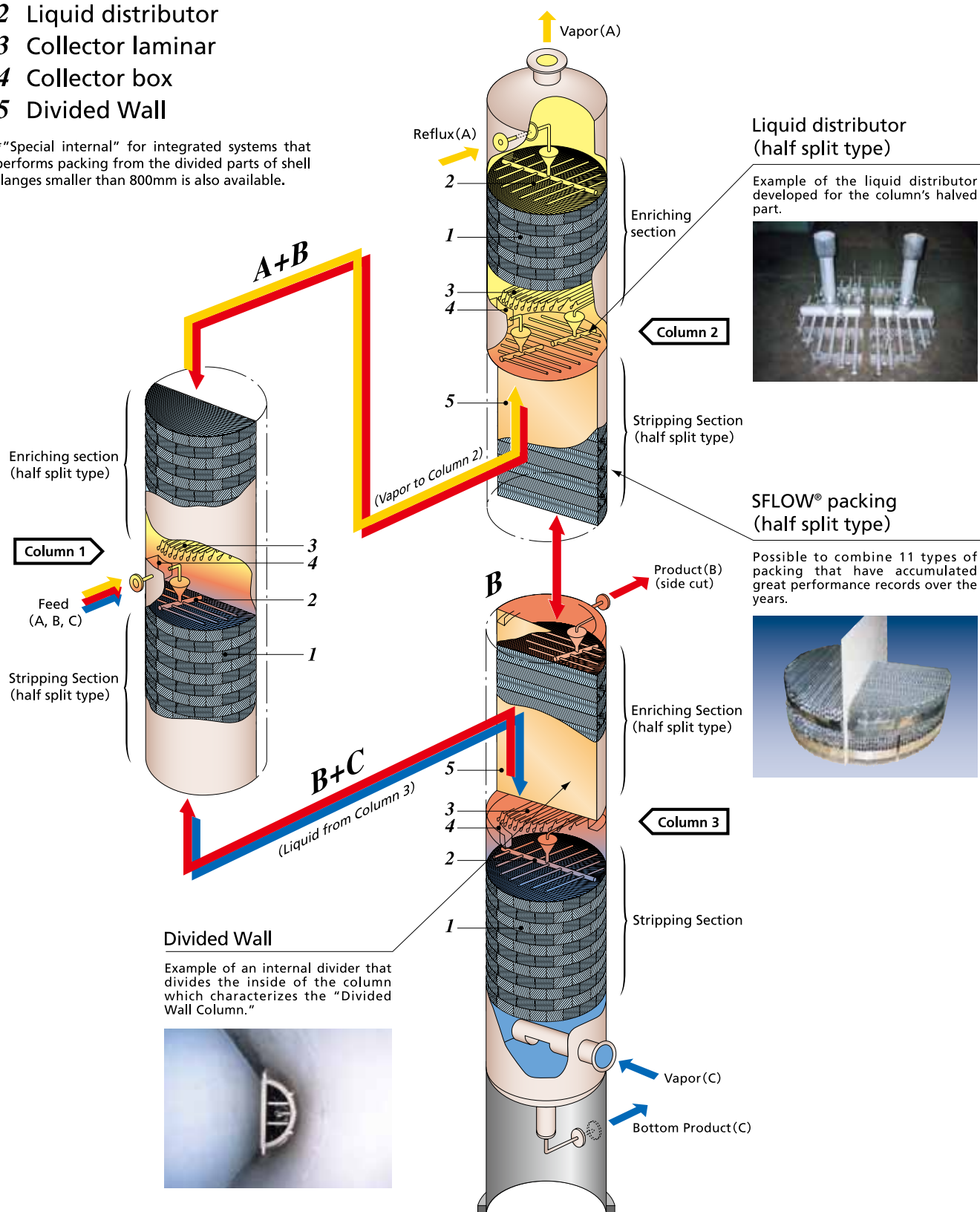
Condenser load



Mechanism of Sumitomo's New Distillation System "Divided Wall Column"

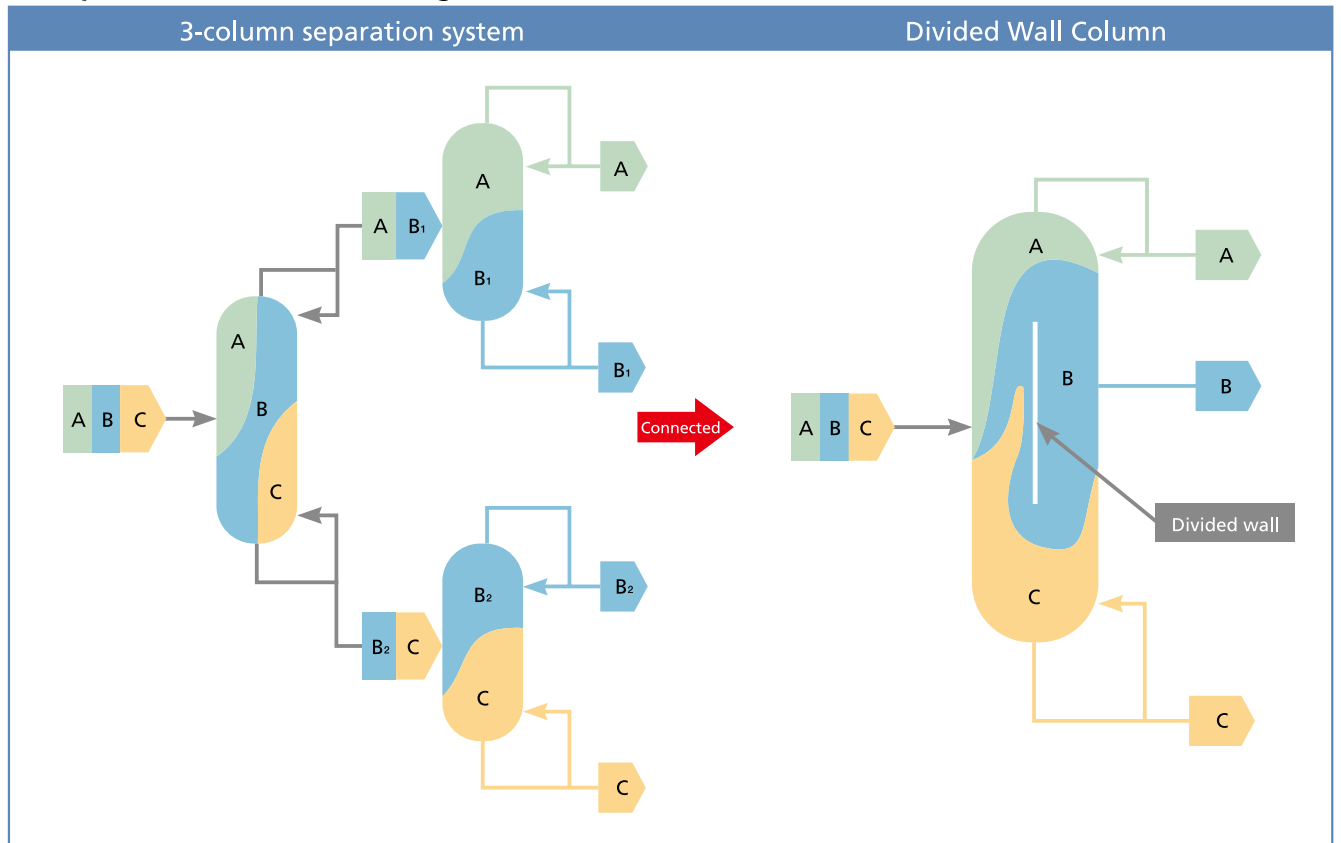
- 1 SFLOW® packing
- 2 Liquid distributor
- 3 Collector laminar
- 4 Collector box
- 5 Divided Wall

Special internal" for integrated systems that performs packing from the divided parts of shell flanges smaller than 800mm is also available.

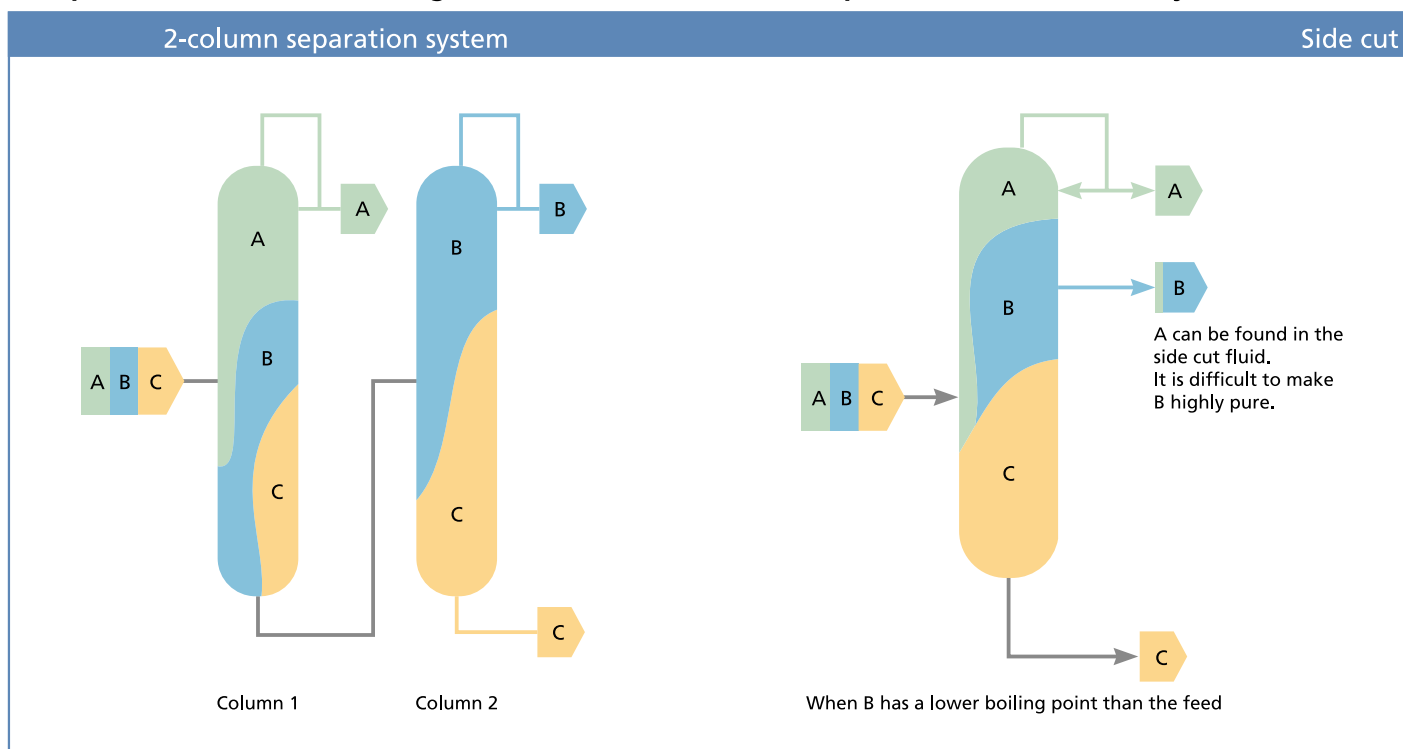


Example of Multi-component Distillation Separation

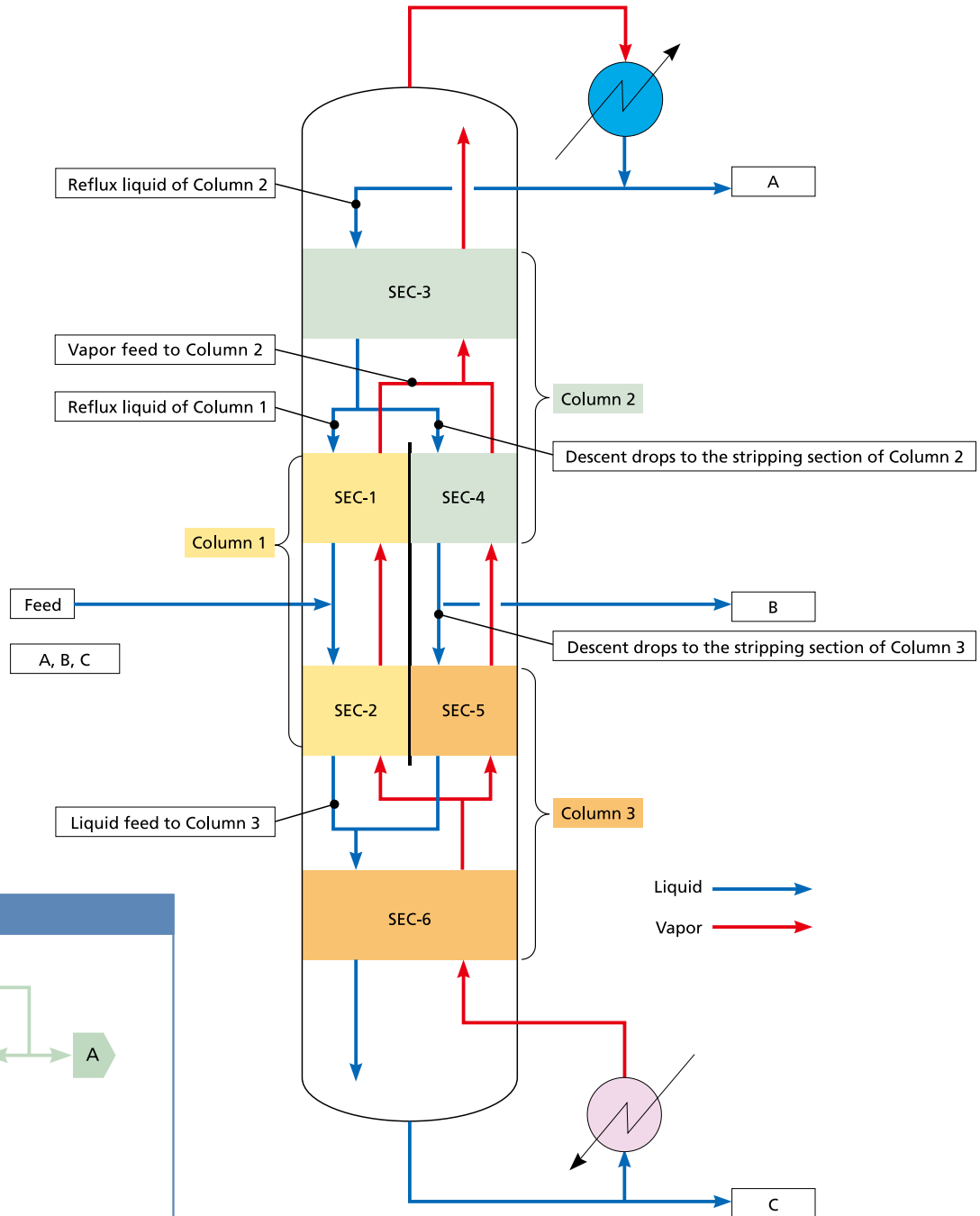
Divided Wall Column integrates 3 columns in one
(composition distribution image of the interior of the 3 constituent columns A, B and C)



Composition Distribution Image inside the Columns of Respective Conventional Systems



Relationship of the Respective Sections Constituting the Divided wall



Column separation system

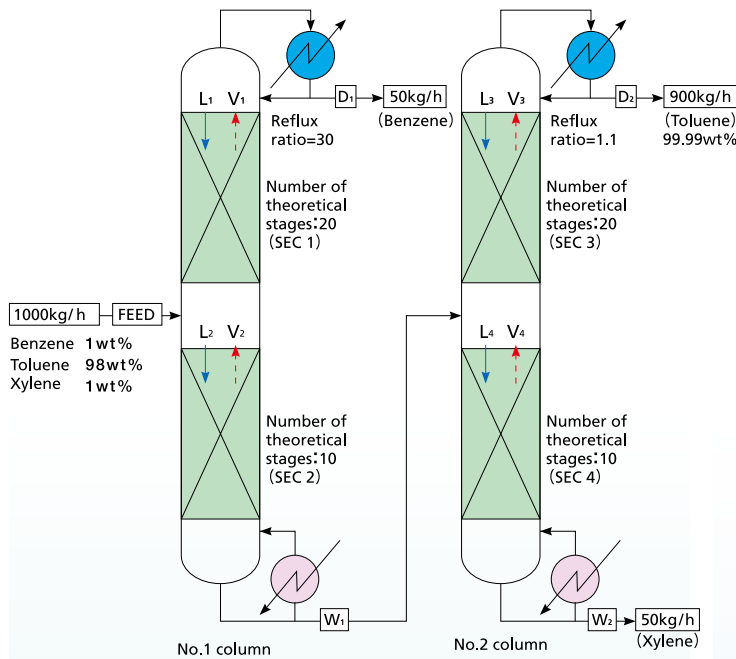
C can be found in the side cut fluid. It is difficult to make B highly pure.

When B has a lower boiling point than the feed



Comparative Example of "Normal Spilt column system" and "Divided Wall Column" (BTX type)

Operational Balance of the Conventional BTX Normal Spilt column system



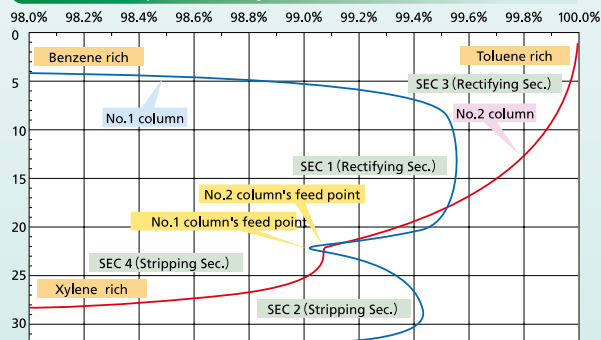
No.1 column

SEC.No.	Liquid Load (kg/h)	Load (kg/h)
—	FEED = 1,000	—
1	L ₁ = 1,500	V ₁ = 1,550
2	L ₂ = 2,600	V ₂ = 1,650

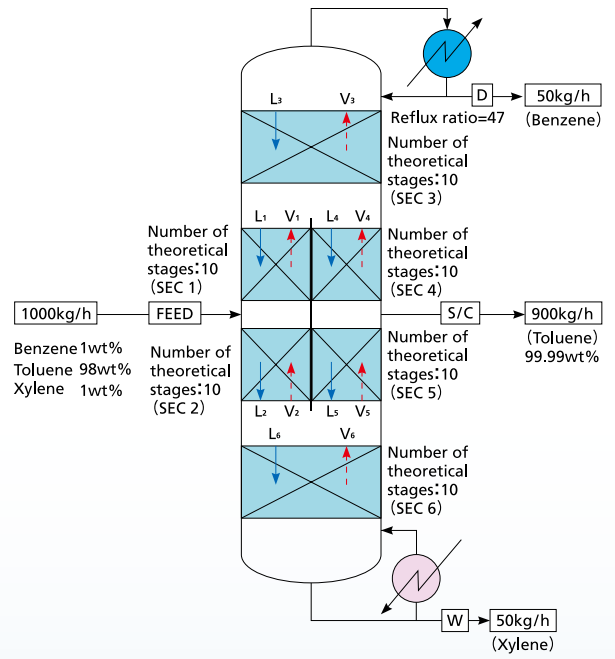
No.2 column

SEC.No.	Liquid Load (kg/h)	Load (kg/h)
—	FEED = 950	—
3	L ₃ = 990	V ₃ = 1,890
4	L ₄ = 1,940	V ₄ = 1,890

Composition Distribution (toluene) in the Columns of the BTX Normal Spilt column system

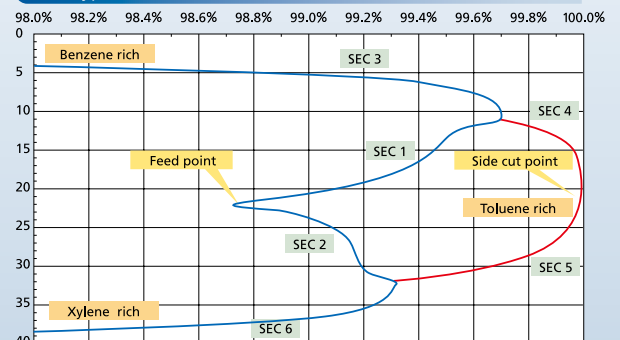


Operational Balance of the Conventional BTX Normal Spilt column system



SEC.No.	Liquid Load (kg/h)	Load (kg/h)
—	FEED = 1,000	—
1	L ₁ = 730	V ₁ = 1,230
2	L ₂ = 1,800	V ₂ = 1,300
3	L ₃ = 2,350	V ₃ = 2,400
4	L ₄ = 1,720	V ₄ = 1,270
5	L ₅ = 820	V ₅ = 1,270
6	L ₆ = 2,620	V ₆ = 2,570

Composition Distribution (toluene) in the Columns of the BTX Type Divided Wall Column



Comparison of Operational Standards to Achieve Same Performance with BTX Types

	Normal Spilt column system			Divided Wall Column
	No.1 column	No.2 column	2-column total	
Required amount of reflux	1,500 kg/h	990 kg/h	2,490 kg/h	2,350 kg/h
Condenser load	140,000 kcal/h	163,000 kcal/h	303,000 kcal/h (100%)	216,000 kcal/h (71%)
Reboiler heat duty	145,000 kcal/h	163,000 kcal/h	308,000 kcal/h (100%)	222,000 kcal/h (72%)

Sumitomo's Multi-Batch "Divided Wall Column" System (multi-batch DWC system)

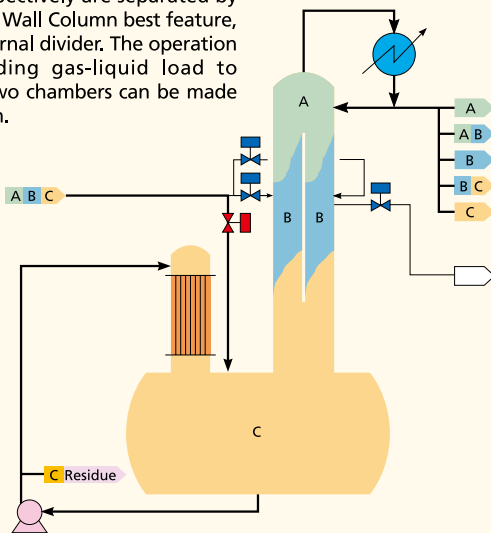
New Distillation System with the 2 Functions of "Batch Distillation Installation" and "2-Column Continuous Distillation Installation"

System Features

1. This new system realizes higher efficiency and multipurpose utilization of facilities by applying Sumitomo's new distillation system "Divided Wall Column" to conventional batch distillation systems.
2. One installation alone can realize 4 types of operational patterns. Perfect for processes handling many varieties.
3. The main sequence of each operational pattern is structured as a standard sequence package.
4. Operations can either be manual or fully automatic.
5. The system is not only suitable for new facilities. Existing batch systems' reboilers, still and condensers can be diverted without any change, allowing only the columns to be replaced with "Divided Wall Column" upon revamping.

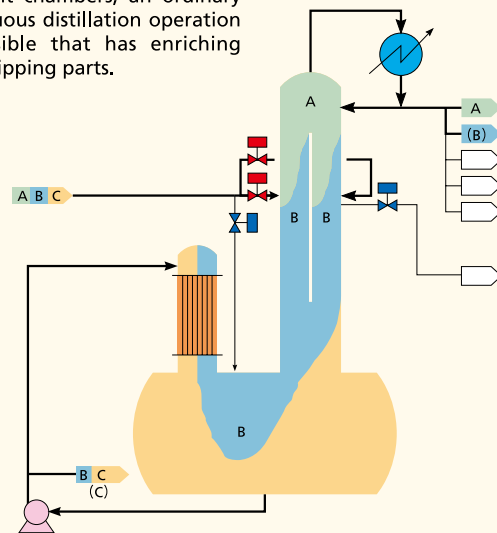
Ordinary Batch Distillation Operational Pattern

Ordinary Batch Distillation Operational Pattern The two split chambers on the right and left respectively are separated by Divided Wall Column best feature, the internal divider. The operation of sending gas-liquid load to these two chambers can be made uniform.



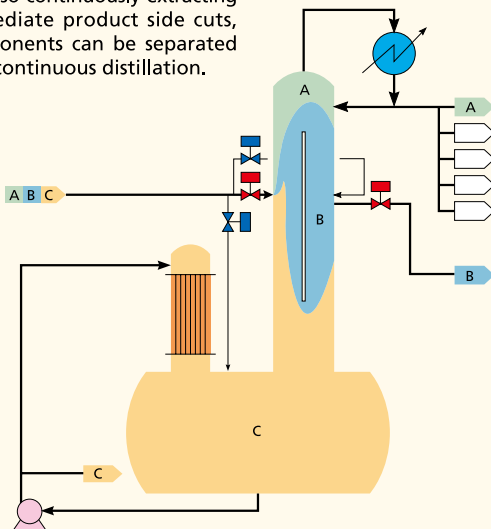
Ordinary Continuous Distillation Operational Pattern

By continuously feeding the materials into both sides of Divided Wall Column's right and left split chambers, an ordinary continuous distillation operation is possible that has enriching and stripping parts.



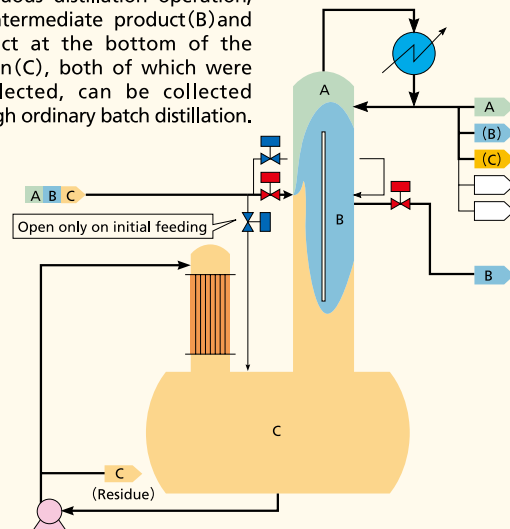
Divided Wall Column's Continuous Distillation Operational Pattern

By continuously feeding materials into Divided Wall Column's right and left split chambers while also continuously extracting intermediate product side cuts, 3 components can be separated in one continuous distillation.



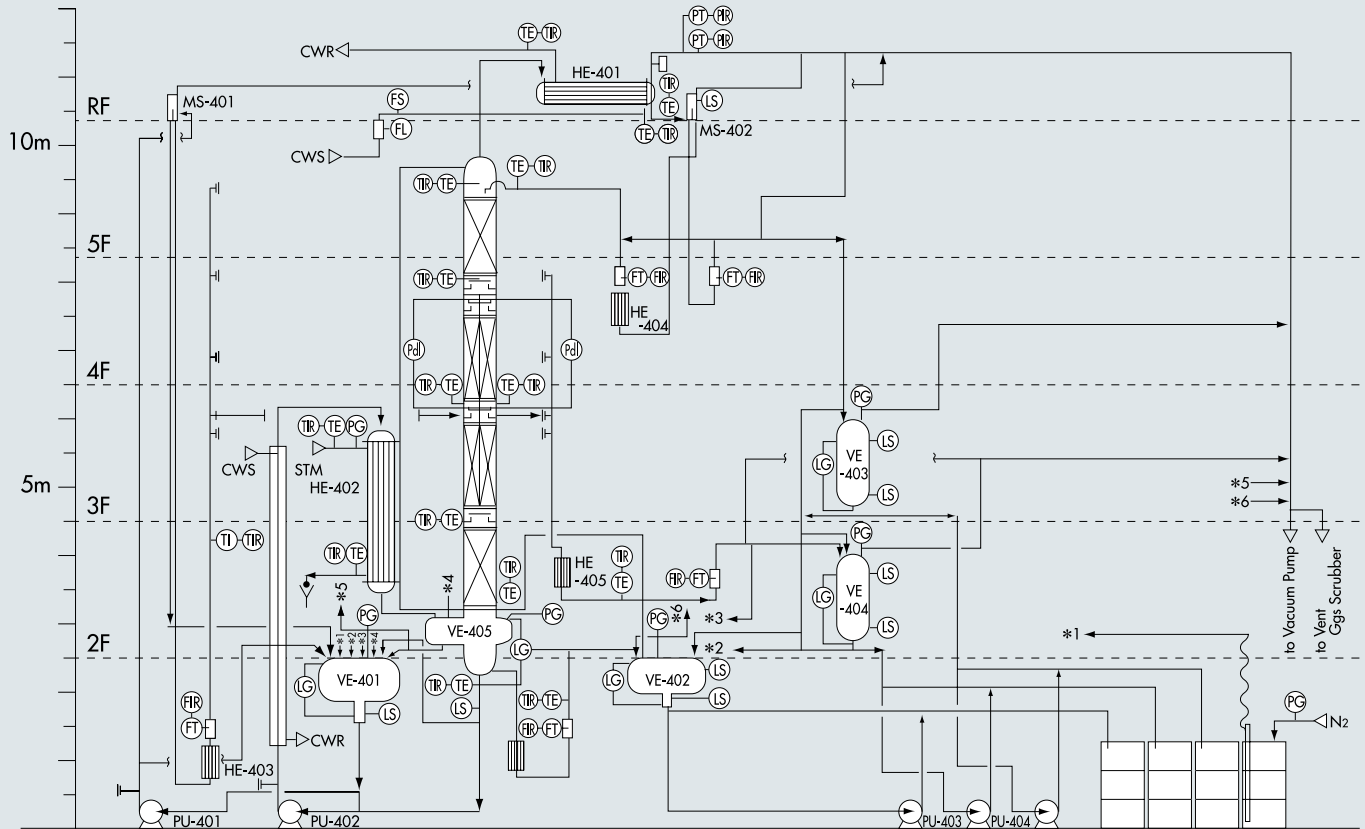
Semi-Batch Type Divided Wall Column's Continuous Distillation Operational Pattern

After producing the overhead product (A) and intermediate B), through Divided Wall Column's continuous distillation operation, the intermediate product (B) and product at the bottom of the column (C), both of which were uncollected, can be collected through ordinary batch distillation.



"Divided Wall Column" Distillation Test Equipment Flow Sheet

Test installation / column diameter: 150A



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