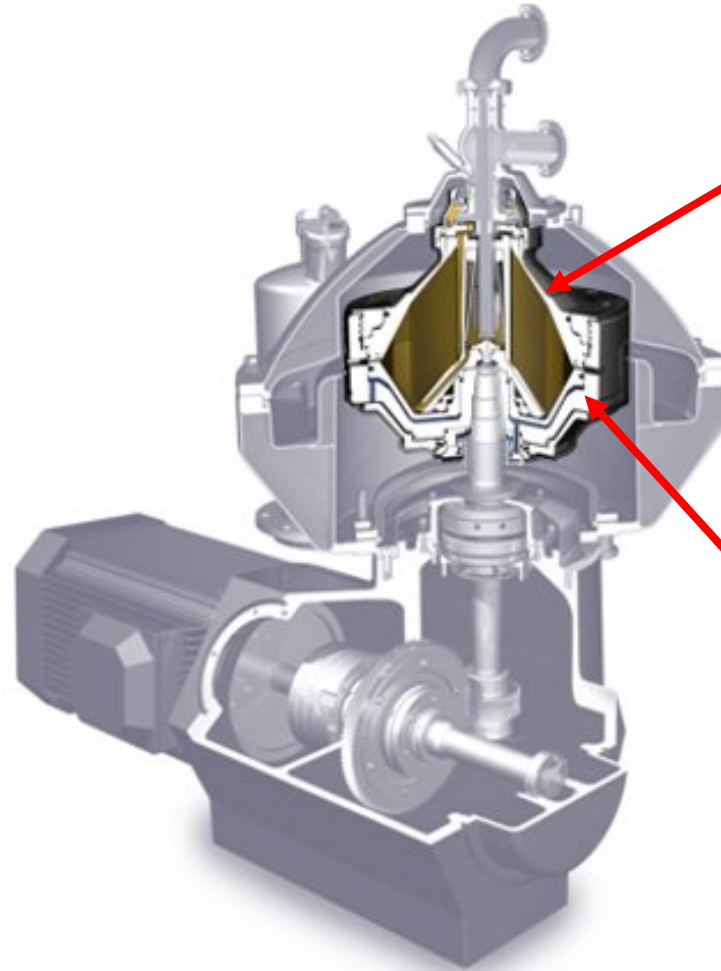


Views of precipitation in the manufacturing of advanced components in duplex

Fredrik Falkenberg

High speed separators



Essential material properties

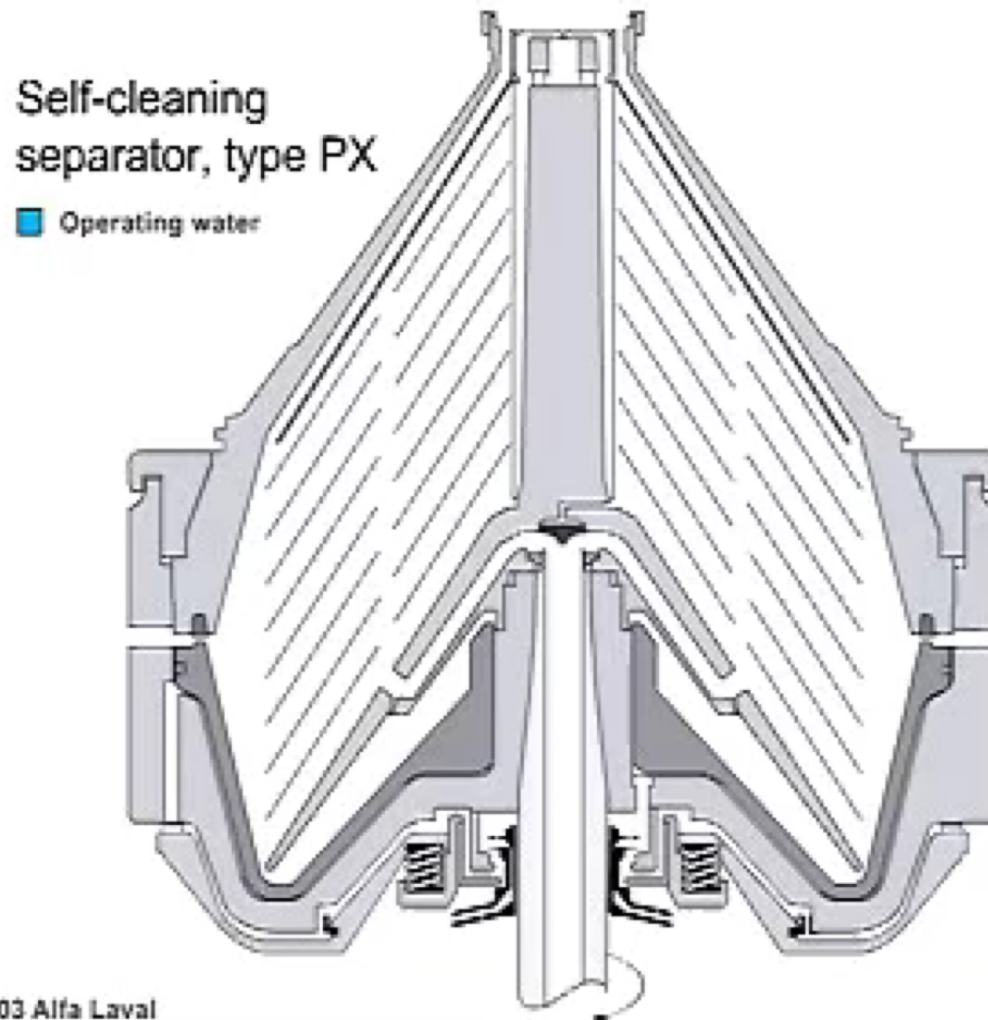
- Strength
- Fracture toughness
- Corrosion resistance

1.4418 Martensitic SS

1.4462 DSS

1.4501 SDSS

Three phase separation



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Safety items requirements

- Drawings
 - Technical Delivery Requirements
 - Material standards



Technical Delivery Requirement (TDR)



- Production equipment requirements
- Production process requirements
 - heat treatment etc.
- First production sample testing (FPQS)
- Testing of material properties
- Certificate
- Etc.



Alfa Laval Corporate Standard
Technical Delivery Requirements
AL 101 0360

Technical Delivery Requirements for Forgings of Steel and Nickel Alloys	Page	1 of 10
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	Status	Active
	Intent	Released for all
Prepared and edited by Corporate Standards	Date	2020-02-07

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Material standards



Alfa Laval Corporate Standard
Material
AL 111 2398-02

Ferritic-austenitic (super - duplex) stainless steel,
wrought

Page	1 of 2
Revision No.	13
Status	Active
Intent	Released for all
Date	2018-05-28

Prepared and edited by Corporate Standards & Regulatory Operations

General material requirement

Shape	Designation	Technical Delivery Requirements
Sheet/plate and strip	EN 10088-2 - X2CrNiMoCuWN25-7-4 Steel No. 1.4501, AT	EN 10088-2, AL 101 0220
Bar	EN 10088-3 - X2CrNiMoCuWN25-7-4 Steel No. 1.4501, AT	EN 10088-3, AL 101 0220
Tubes, seamless	EN 10297-2 - X2CrNiMoCuWN25-7-4 Steel No. 1.4501, AT	EN 10297-2, AL 101 0220
Forgings	EN 10088-3 - X2CrNiMoCuWN25-7-4 Steel No. 1.4501, AT AT = Solution annealed	EN 10088-3, AL 101 0220

Alternative material

Shape	Designation	Technical Delivery Requirements
Sheet/plate and strip	ASTM A240/A240M - UNS S32760, AT	ASTM A480/A480M, AL 101 0220
Bar	ASTM A276/A276M - UNS S32760, AT	ASTM A484/A484M, AL 101 0220
Tubes welded/ seamless	ASTM A789/A789M - UNS S32760, AT	ASTM A1016/A1016M, AL 101 0220
Forgings	ASTM A473 - UNS S32760, AT	ASTM A484/A484M, AL 101 0220

For safety items!

Alfa Laval Corporate Standard
Material
AL 111 2398-02

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Additional Alfa Laval requirements

- If inspection class 1 or 2 is specified in the purchasing documents (drawings, orders etc.);
Technical delivery requirements AL 101 0360 shall be applied for forgings and AL 101 0362 for bars.

- Proof strength ($R_{p0.2}$): 550MPa minimum

- Tensile strength: 750MPa minimum

- Impact strength: KV 100J minimum at -10°C

- Chemical composition: PREN = %Cr + 3.3*%Mo + 16*%N ≥ 40,0

- Micro structure: Ferrite content 35-55%, shall be free from Inter-metallic phases and precipitations

- Corrosion resistance according to AL 101 5175: Method A: +150 mV minimum relative a KCl-saturated Ag electrode. Method B: No Sensitivity

Material testing on each melt and heat treatment batch

- Approved suppliers only
- Technical audits of steel-, forging-, casting- and heat treatment suppliers
 - heat treatment requirements etc.
- Testing by the supplier on samples from actual black forging/casting (3.1 certificate)
- In house testing
 - receiving inspection
 - hardness
 - penetrant testing after final machining
 - over speed rotation
- Traceability throughout the entire supply chain



