

ABB13 D Combustion parts

SULZER

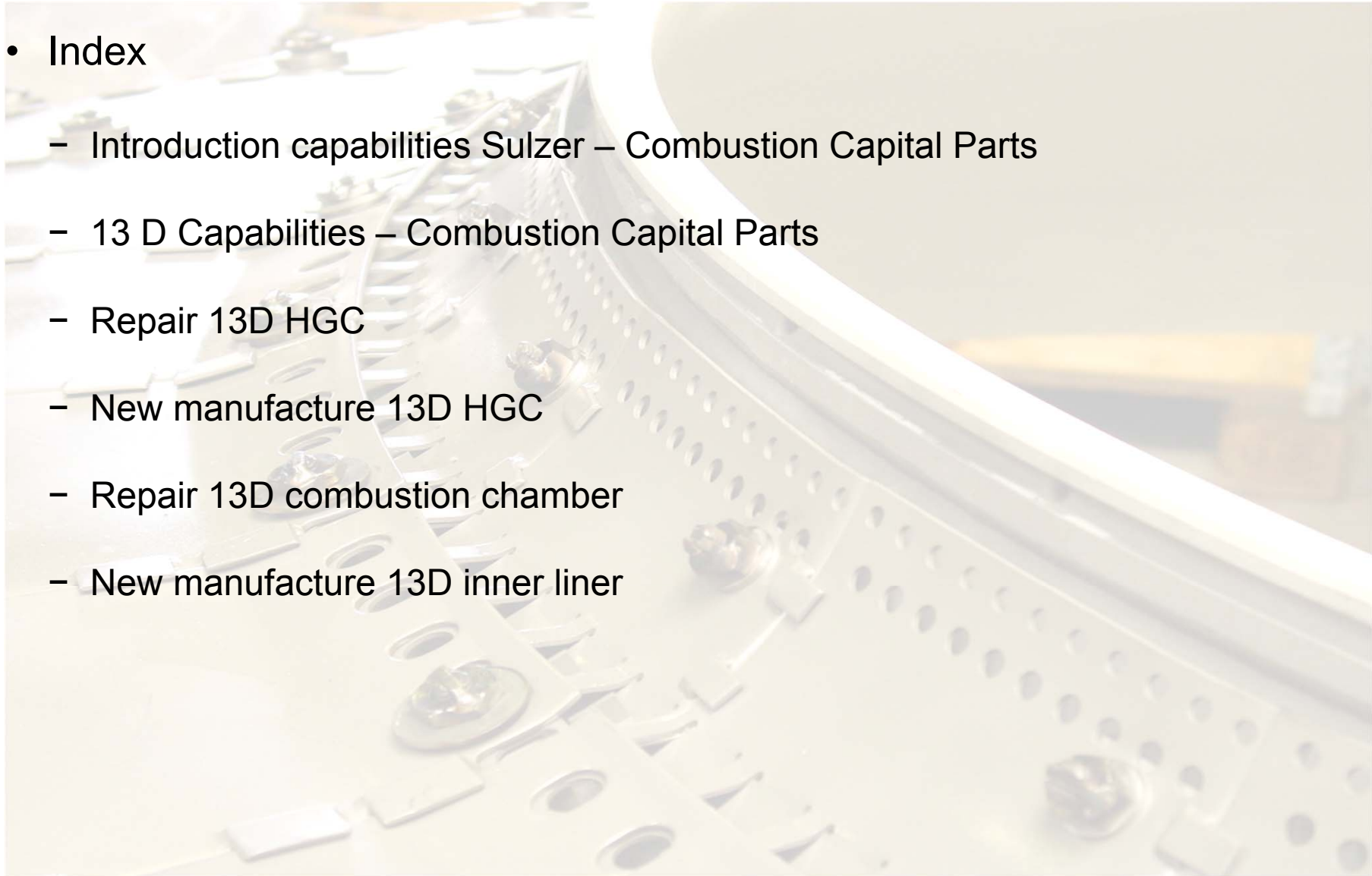
Turbo Services



Achieving **the Extraordinary™**

ABB13 D Combustion parts

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 - Introduction capabilities Sulzer – Combustion Capital Parts
 - 13 D Capabilities – Combustion Capital Parts
 - Repair 13D HGC
 - New manufacture 13D HGC
 - Repair 13D combustion chamber
 - New manufacture 13D inner liner



Sulzer Turbomachinery Services Venlo

SULZER
Turbo Services



CAPABILITIES

COMBUSTOR PARTS

STS Venlo Capabilities – Combustion Parts

- STS Venlo has been active in repair and new parts supply since early 80's
- STS Venlo possesses all essential competences for successful component manufacturing and repair, giving the capability to produce all ABB 13 DM combustion capital parts.
- After 30 years of repair experience, STS Venlo knows strong and weak points of every engine type of every OEM. This knowledge provides strong in house bases for reverse engineering and design improvements.

Introduction: ABB 8



New & repair Inner Liner



Repair Hot Gas Casing

Introduction: ABB 9



New & repair Hot Gas Casing



New & repair Inner Liner

Introduction: ABB 11



New & repair Inner Liner



New & repair U-duct



New & repair Hot Gas Casing



Introduction: ABB 13 B/C



New & repair Hot Gas Casing



New & repair U-duct

Introduction: ABB 13D



New & repair Inner Liner



New & repair Air nozzle



New & repair Hot Gas Casing

Introduction: ABB13 E2



Repair Zone 2 Inner Liner



Repair Zone 2 Outer liner

Introduction: Siemens V93



New & repair Inner casing



New & repair Mixing chamber

Introduction: Siemens V94



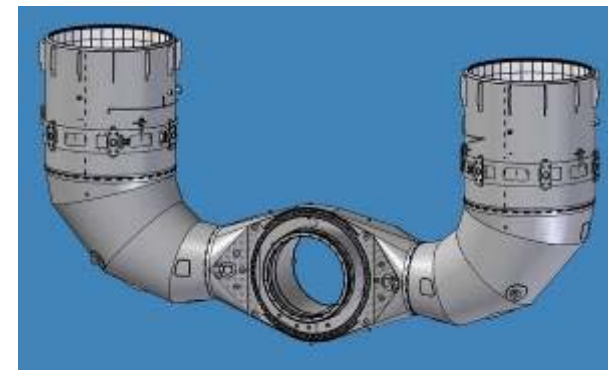
New & repair Inner casing



New & repair Flame tubes



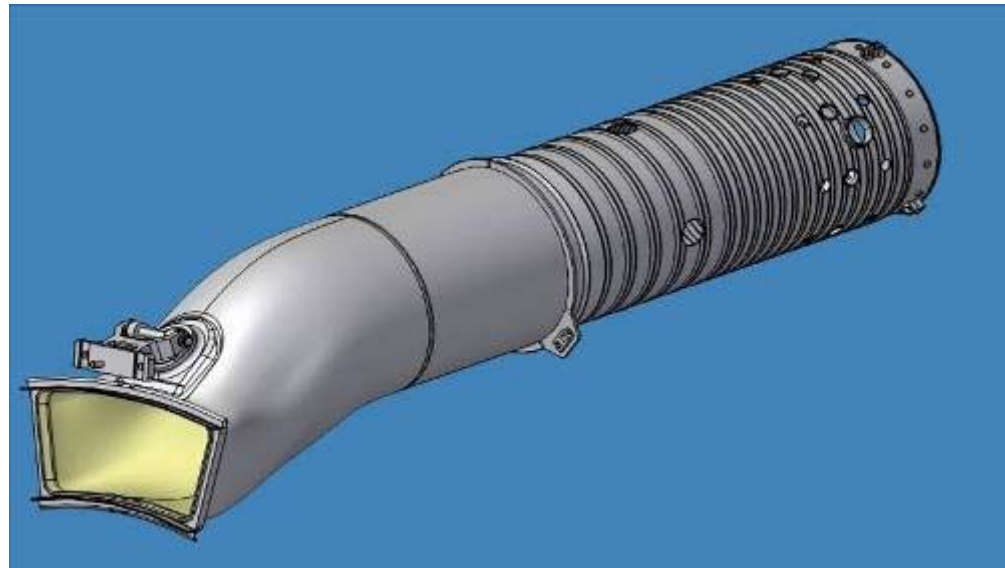
New & repair Mixing chamber



Introduction: Liners / Transition Pieces

New manufacturing of "thin" sheet components like:

- GE frame7/9 Combustion liner
- GE frame 7/9Transition pieces
- Westinghouse 501 CL en TP
- Mitsubishi 501/701D CL en TP



Introduction: Liners



New manufacturing of GE Frame 7/9 combustion liners



Introduction: Transition pieces



Frame 9 transition piece
Type 9171

New manufacturing of GE Frame 7/9
Transition pieces

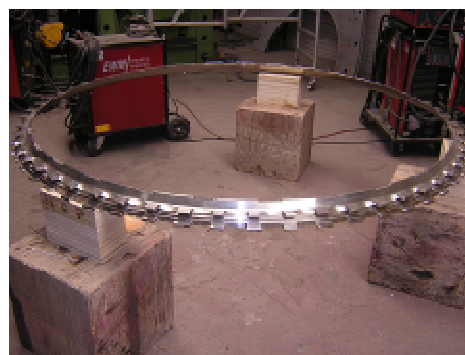


Frame 7 transition piece

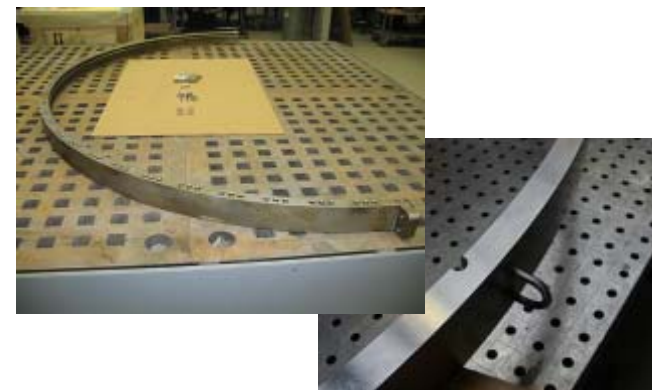
Introduction : New manufacture related hardware



Inner tube (33K or 41K)



Inlet bowl



K-ring in all versions



Inlet collars



Dog bone seals

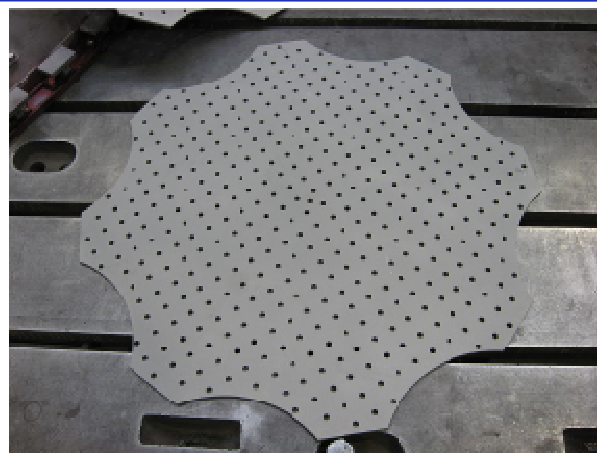


Belt seals

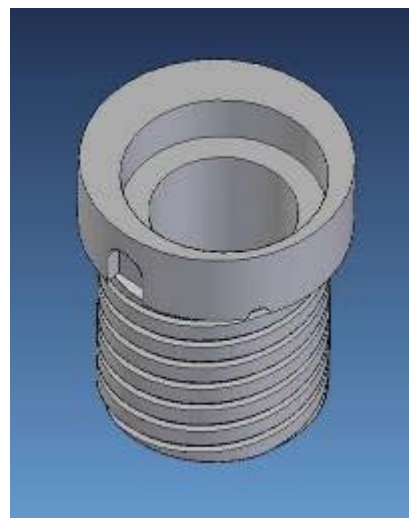
Introduction: New Manufacture related hardware



Cooling rings



Flame tube plates



Excentric bush, excentric pen and related hardware

Introduction : Example new manufacture



Forming of sheet metal and construction of body by welding



Heat treatment and Machining



Assembling of subparts



TBC coating of large combustion components



Conclusions

- STS Venlo has repaired and/or manufactured a wide variety of combustion capital parts for
 - Siemens V93 and V94
 - ABB8, ABB9, ABB11, ABB13 (including 13DM and 13 DM)
 - GE, Mitsubishi, Westinghouse
- STS Venlo possesses all essential competences for successful component manufacturing and repair, giving the capability to produce all ABB 13 DM combustion capital parts

13 D COMBUSTOR PARTS

13 D GT – Combustion capital parts

- Repair 13D HGC
- New manufacture 13D HGC
- Repair 13D Combustion chamber
- New manufacture 13D inner liner

Repair of 13D HGC

Incoming inspection



As received



Dented sections



Distortion by split line



Cleaning and crack inspection

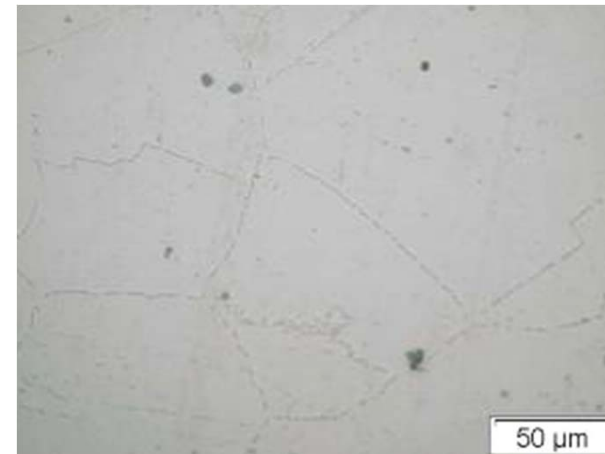
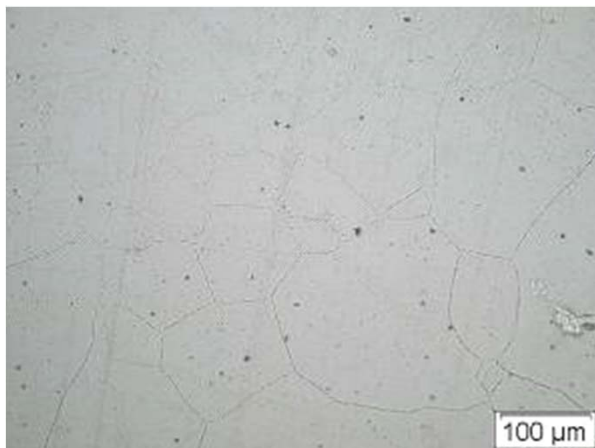
Rejuvenation heat treatment

Restoration of material properties and dimensions of component during heat treatment with special fixture

As received



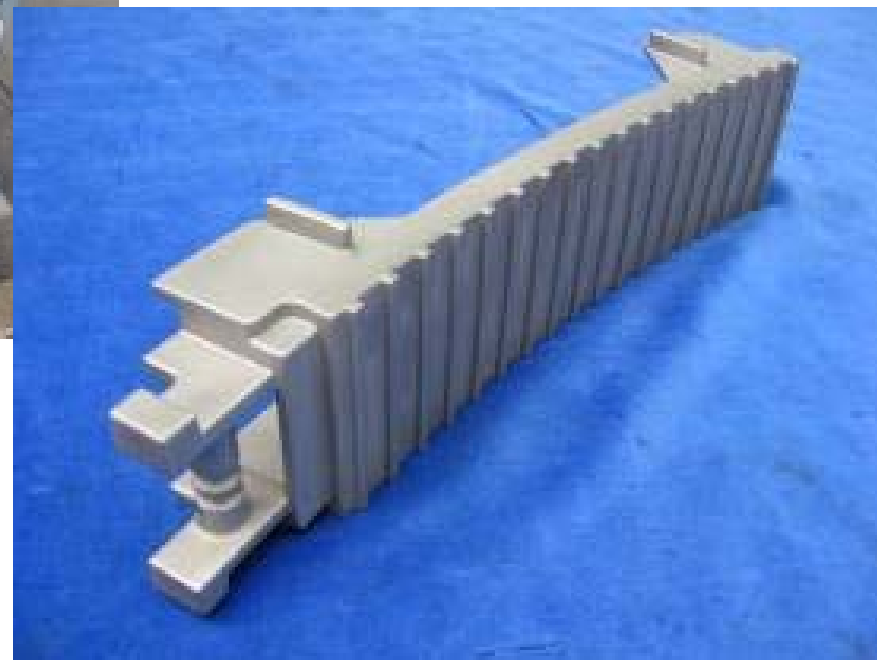
After rejuvenation



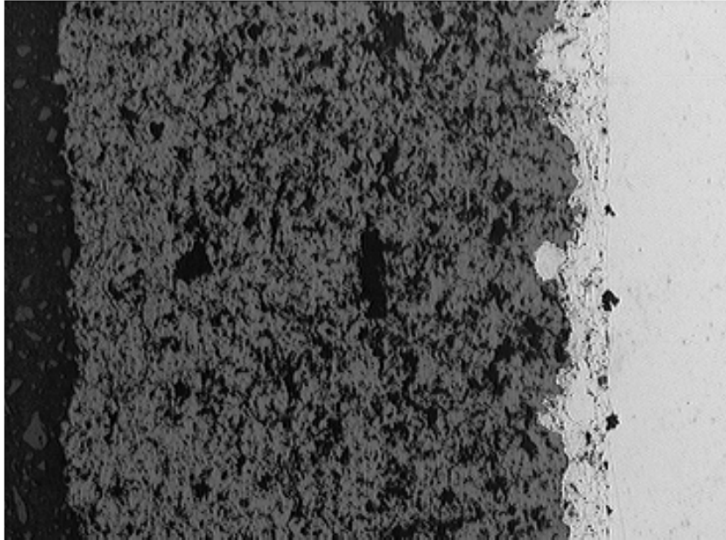
Extended repair / repair of dented sections



Replacement of collar



TBC Coating



Final inspection and dispatch



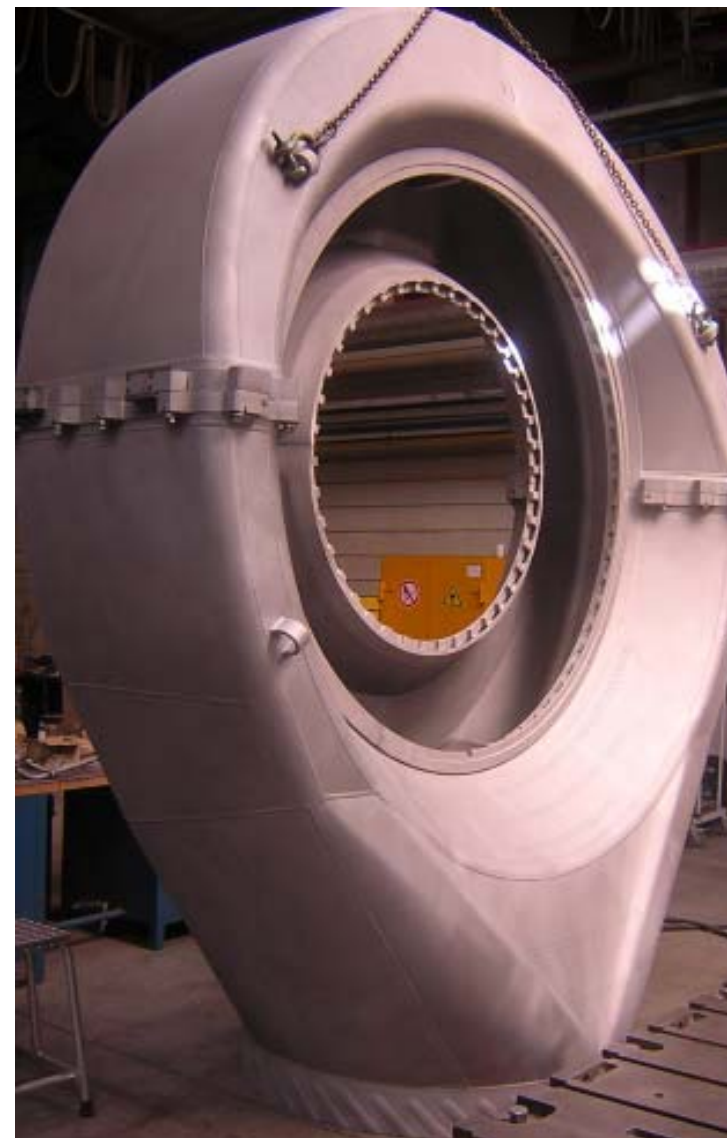
New manufacture of 13D HGC

Difference in configurations – new HGC

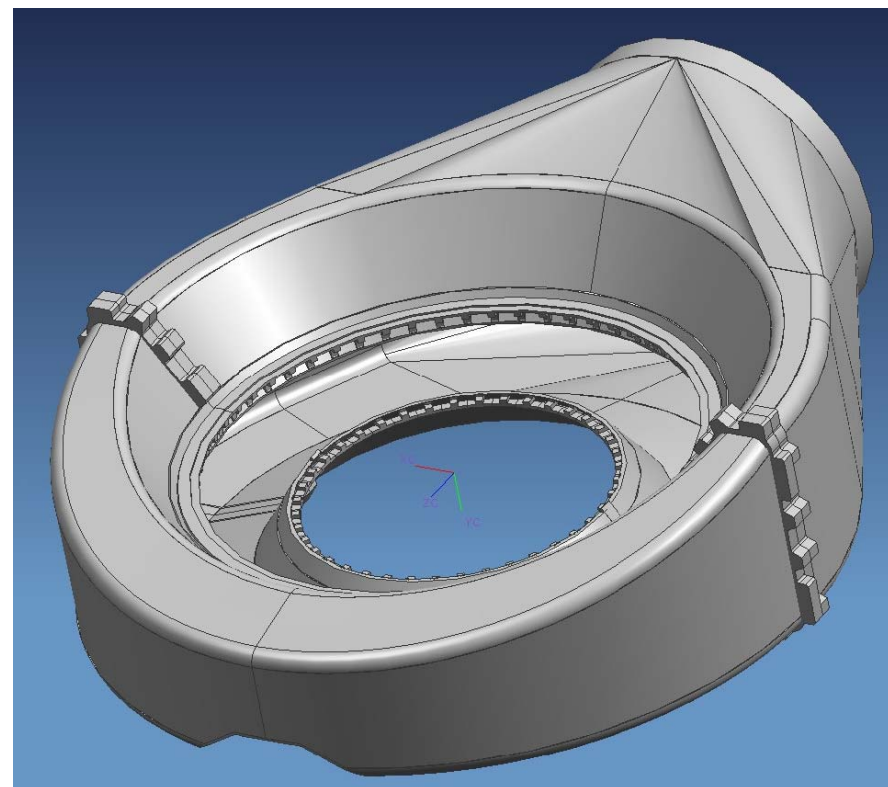
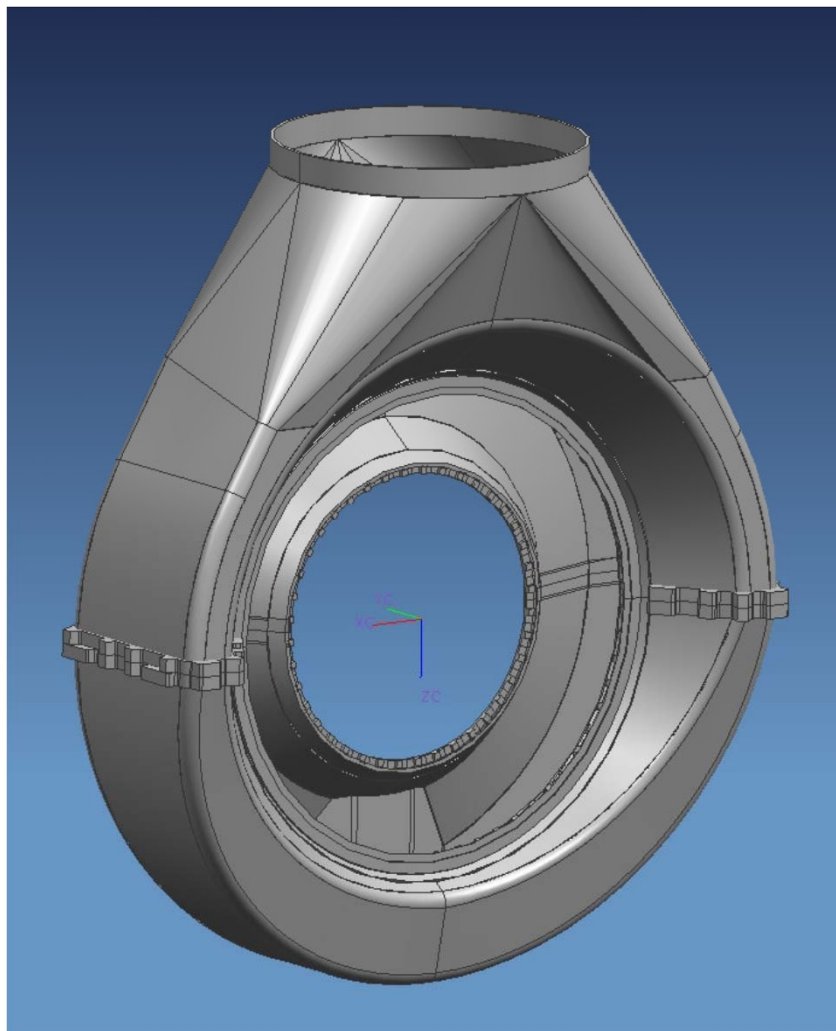
Differences in design of HGC (consignment date, upgrades performed...?)

- General dimensions of sheet metal of top and bottom half
- Inlet collar with slots pressed / machined
- Inlet collar with / without belt seals
- Design of split line and bolting of split line
- Cooling pattern of Hot Gas Casing
- Stiffening ribs
- Configuration of flow divider
- Antivibration key

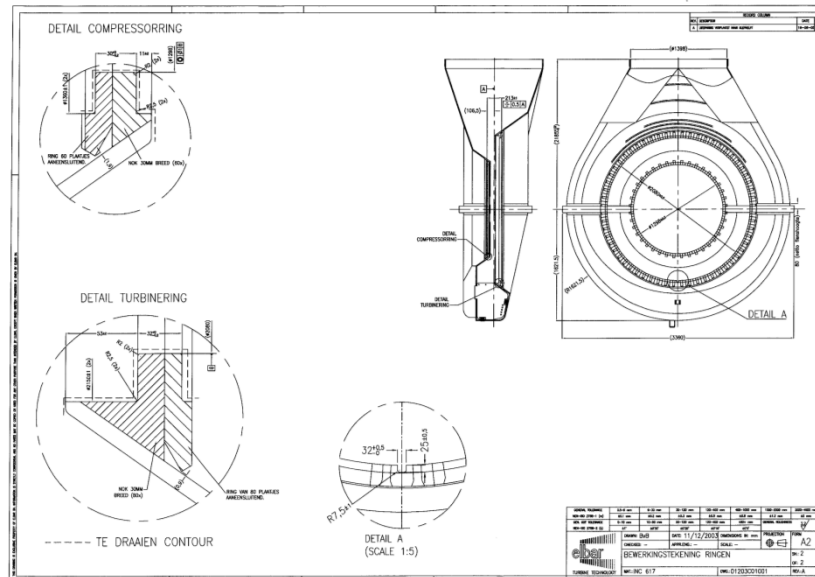
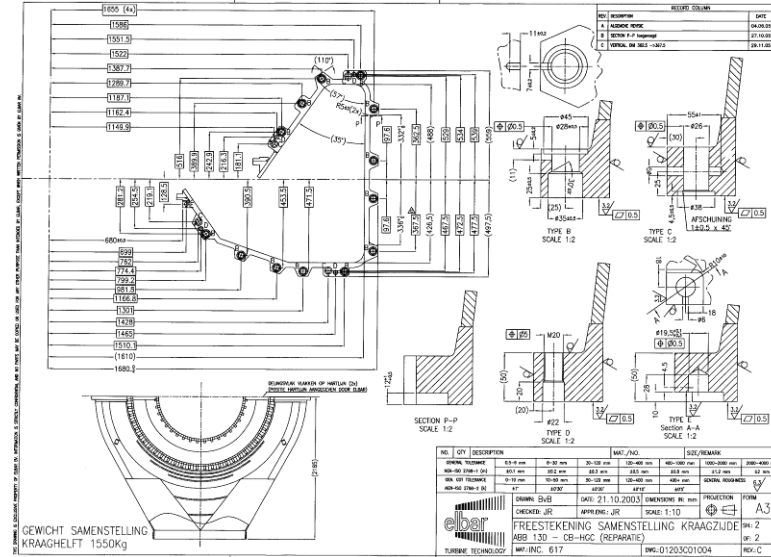
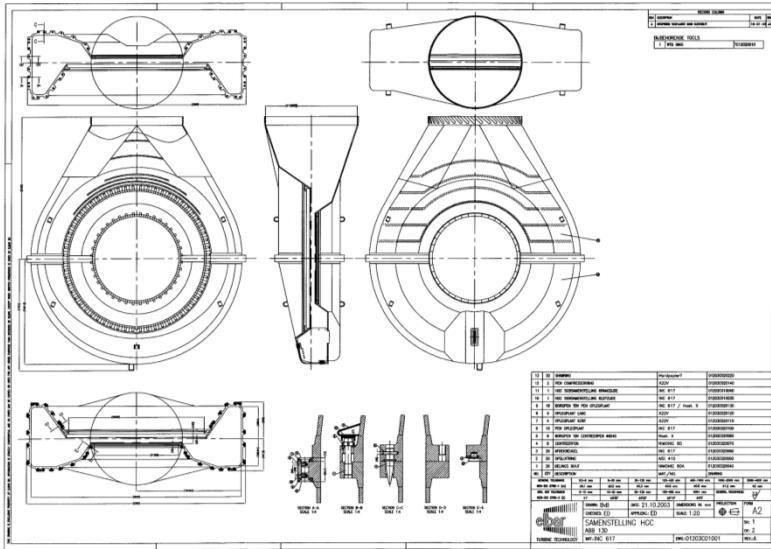
Difference in configurations – new HGC



Design 13D HGC



Design 13D HGC



New manufacture 13D HGC

Quality plan

Seq. No.	Description Operation and Inspection Activities	Freq.	Specifications/ Acceptance Standards	Type of Record	To be Executed By		Executed				Remarks	
					STS Venlo	Customer	STS Venlo	Customer				
1	Purchasing of materials		EN 10204	Material Certificates 3.1B	A	R						
2	Manufacturing of subparts		STS Venlo Drawings		A	-						
3	Inspection of subparts		STS Venlo Drawings	Dimensional Inspection Report	A	R						
4	Assembly of sheet metal by welding		EOS 4031 TIG/MIG welding EN 287-NEN-ISO 9605-4/15607/15609/15614-1 WPS 24/25/26/27/28	Welding Procedure Specification Welding Procedure Approval Record Welder Qualification	A	-						
5	Inspection sheet metal after welding - Dimensional - Dye check - Visual - Radiographic	100% welds 100% welds	STS Venlo Drawings EOS 1531/QAS 006.2 PT /NEN-ISO 5817 classB	Dimensional Inspection Report NDT Report	A	R						Qualified ASNT-TC-1A level 2 inspector
6	Forming of sheet metal		Material thickness verification Contour verification acc. STS Venlo drawings									Subcontracting
7	Mounting of jigs and fixtures on sheet metal assembly for heat treatment		Work Instruction		A	-						
8	Stress relieve Heat treatment body	1	EOS 3011, 3h/980°C	Furnace Chart	A	R						Subcontracting
9	Cleaning by Aluminum oxide blasting	1	EOS 2031 Aluminum Oxide Blasting		A							
10	Inspection sheet metal after welding - Dimensional - Dye check - Visual - Radiographic - Metallographic	100% welds 100% welds	STS Venlo Drawings EOS 1531/QAS 006.2 PT /NEN-ISO 5817 classB	Dimensional Inspection Report NDT Report	A	R						Qualified ASNT-TC-1A level 2 inspector
11	Assembly of flanges and other elements by welding		EOS 4031 TIG/MIG welding EN 287-NEN-ISO 9605-4/15607/15609/15614-1 WPS 24/25/26/27/28	Welding Procedure Specification Welding Procedure Approval Record Welder Qualification	A	-						
12	Inspection of liner after welding - Dimensional - Dye check - Visual - X-ray	100% welds 100% welds	STS Venlo Drawings EOS 1531/QAS 006.2 PT /NEN-ISO 5817 classB	Dimensional Inspection Report NDT Report	A	R						Qualified ASNT-TC-1A level 2 inspector
13	Mounting of jigs and fixtures on sheet metal assembly for heat treatment		Work Instruction		A	-						
14	Stress relieve Heat treatment body	1	EOS 3011, 3h/980°C	Furnace Chart	A	R						Subcontracting
15	Cleaning by Aluminum oxide blasting	1	EOS 2031 Aluminum Oxide Blasting		A							
16	Inspection - dimensional - visual - Dye penetrant - X-ray	100% 100% 100% fo 10% of	STS Venlo drawings EOS 002, EN-ISO 5817 level B EOS 007, EN-ISO 5817 level B NEN-ISO 5817 level B	Dimensional inspection report NDT report dye check NDT report X-ray, X-ray films	A	R						

New manufacture 13D HGC

Quality plan

16	Inspection - dimensional - visual - Dye penetrant - X-ray	100% 100% 100% fo welds 10% of	STS Venlo drawings EOS 002, EN-ISO 5817 level B EOS 007, EN-ISO 5817 level B NEN-ISO 5817 level B	Dimensional inspection report NDT report dye check NDT report X-ray, X-ray films	A	R											
17	Machining sheet metal assembly		Work Instruction STS Venlo drawings		A	-											Subcontracting
18	Inspection - visual - dimensional	100% 100%	EOS 002 STS Venlo drawings	Dimensional inspection report	A	R											
19	Assembly of cooling pannels, bone segments, steel flanges		Work Instruction STS Venlo drawings	Dimensional inspection report of clearances	A	-											
20	Application of TBC	100%	EOS 6031 QAS 008 APS coating Elbar drawing	Lab report	A	R											
21	Final Inspection - visual - dimensional - dimensional on fixture	100% 100%	STS Venlo drawings	Dimensional inspection report Final report Certificate of Compliance	A	H/W											Evaluation of inspection results by Customer

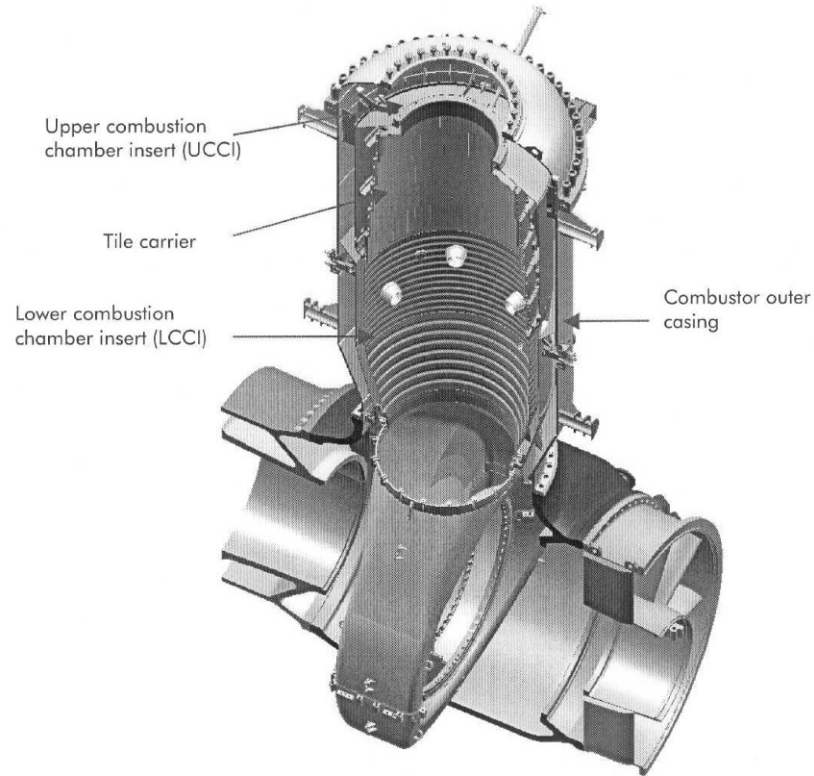
EOS: STS Venlo Operation Specification
QI: Quality Instruction

A Approved/ Perform
R Review
W Witness
H Hold

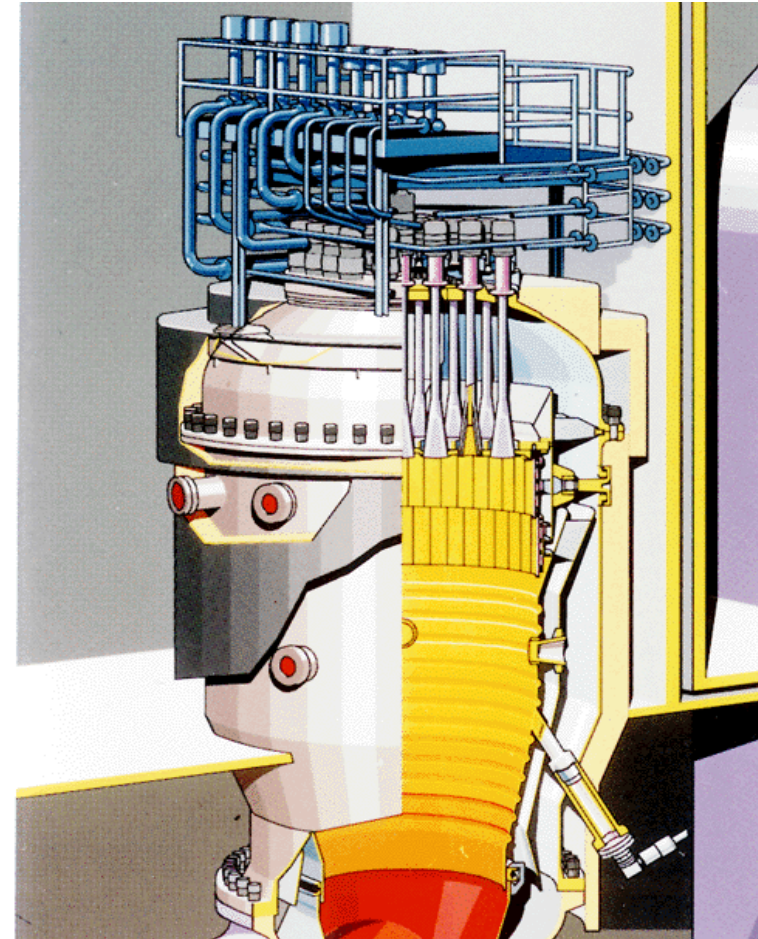
Manufacturer Signature		Customer Signature
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Repair of 13 D Combustion chamber

Configurations combustion chamber



Silo burner



EV burners

ABB 13D Combustion Chamber



complete combustion chamber as received



disassembly upper combustion chamber



disassembly lower combustion chamber

ABB 13D Inner liner



Inner liner disassembled



Inner liner dye check

ABB 13D Tile carrier



ABB 13D Tile carrier



ABB 13D Tile carrier

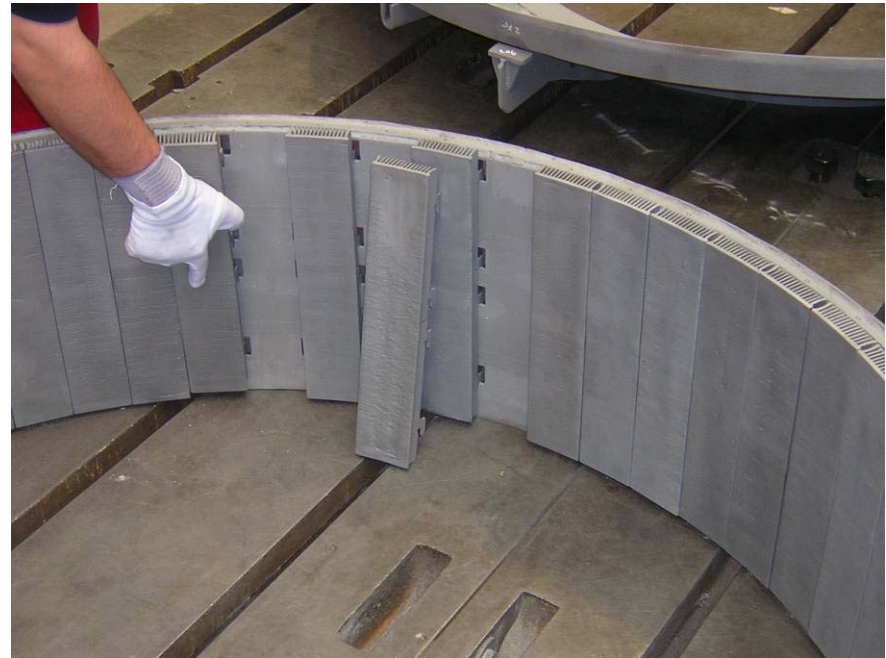


ABB 13D combustion chamber Repair

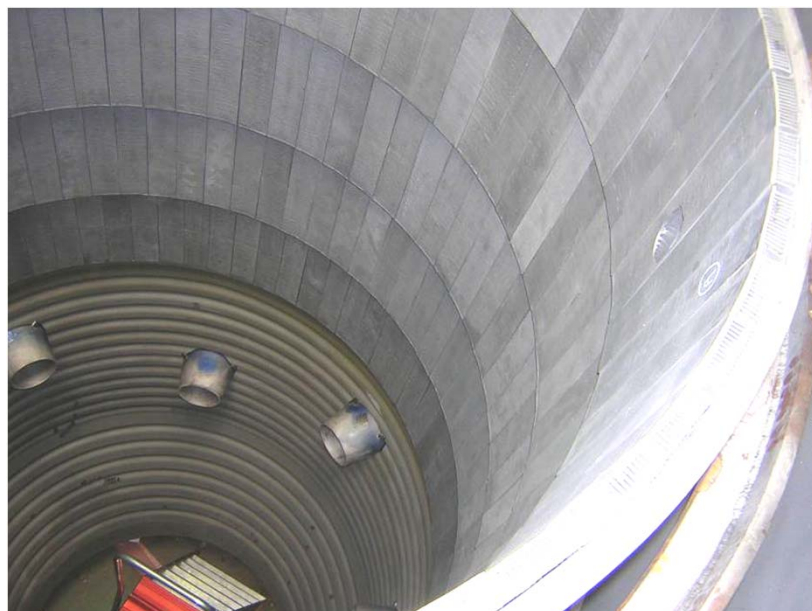


assembly lower combustion chamber and tile carrier frame



assembly upper and lower combustion chamber

ABB 13D Combustion Chamber



Combustion chamber after repair and assembly

New manufacture of 13D Inner liner

ABB 13D Combustion chamber

New manufacture



ABB 13D combustion chamber Repair

airnozzles, new manufacture



New manufacture 13D Inner liner

Quality plan

Issue 1, 16 July 2003

raised by QA / J. van Rens

ABB13D Qplan inner liner_essent 14-2-05

QUALITY PLAN OF ABB 13D INNER LINER								
Qty: 1								
ELBAR ORDERNR.: 44945								
CUSTOMER: ESSENT ENERGIE PRODUCTIE B.V. DONGE CENTRALE GEERTRUIDENBERG								
Nr.	Discription Inspection activities	Specifications	Reports	To be executed by		Executed		Remarks
				Elbar	Customer	Elbar	Customer	
1	Kick-off meeting			X	X	JR	✓	
2	Purchasing of materials	Inconel 617	Material certificates	A	R	JR	✓	
3	Manufacturing of sub-parts	Elbar drawings	Dimensional inspection report	A	R	JR	✓	
4	Material inspection		NDO report	A	W	JR	✓	Check area around welds for lack of segregation (Ultrasonic test)
5	Assembling of sheet metal parts by welding	Engineering instruction Welding procedures : WPS_12,24,26	Welding procedure qualification, Welder qualification	A	R	JR	✓	
6	Dimensional inspection	Elbar drawings	Dimensional inspection report	A	R	JR	✓	
7	Crack inspection by Dye-check	EOS 007	NDO report	A	W	JR	✓	
8	Stress relieve heattreatment	Engineering instruction	Furnace chart	A	R	JR	✓	
9	Dimensional inspection	Elbar drawings	Dimensional inspection report	A	R	JR	✓	
10	Cleaning by aluminum oxide blasting	EOS 015		A	R	JR	✓	
11	Visual inspection	Engineering instruction		A	R	JR	✓	
12	Crack inspection by Dye-check	EOS 007	NDO report	A	W	JR	✓	Crossings of welds only
13	Dimensional adjustments		Dimensional inspection report	A	R	JR	✓	Depends on type of build-in inner liner and hot gas casing
14	Cleaning by aluminum oxide blasting	EOS 015		A	R	JR	✓	
15	Application of hardface coating on inlet and outlet collar		Test piece analyse and wall thickness report	A	R	JR	✓	
16	Final inspection	Engineering instruction	Final inspection report Certificate of Compliance	A	W	JR	✓	

Quality Plan approved by:

ELBAR

Kema

R = Review
H = Hold
W = Witness
A = Approved





Name:

Date:

K. Stoker
050422

Contact information



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