NELES

Welcome and thank you for attending this session

Product school - Neles Neldisc ™

Triple Eccentric Metal Seated Butterfly Valves

Data privacy

Practicalities

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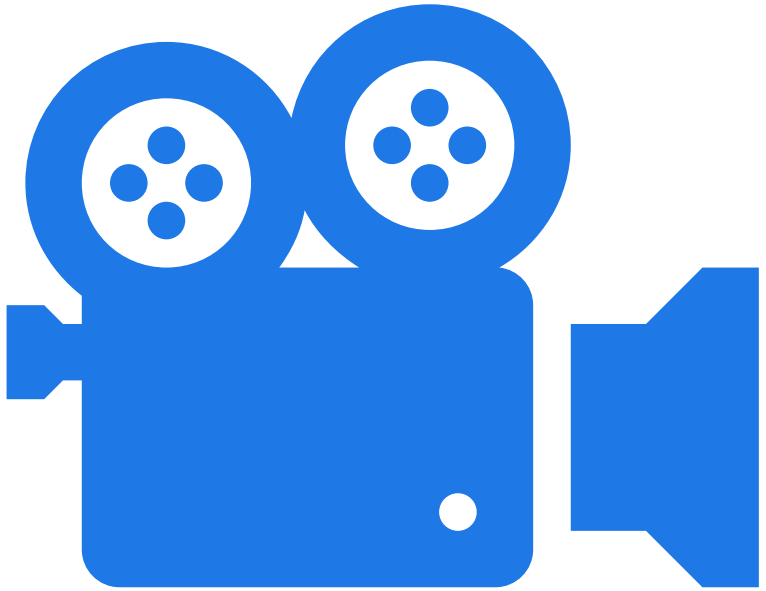
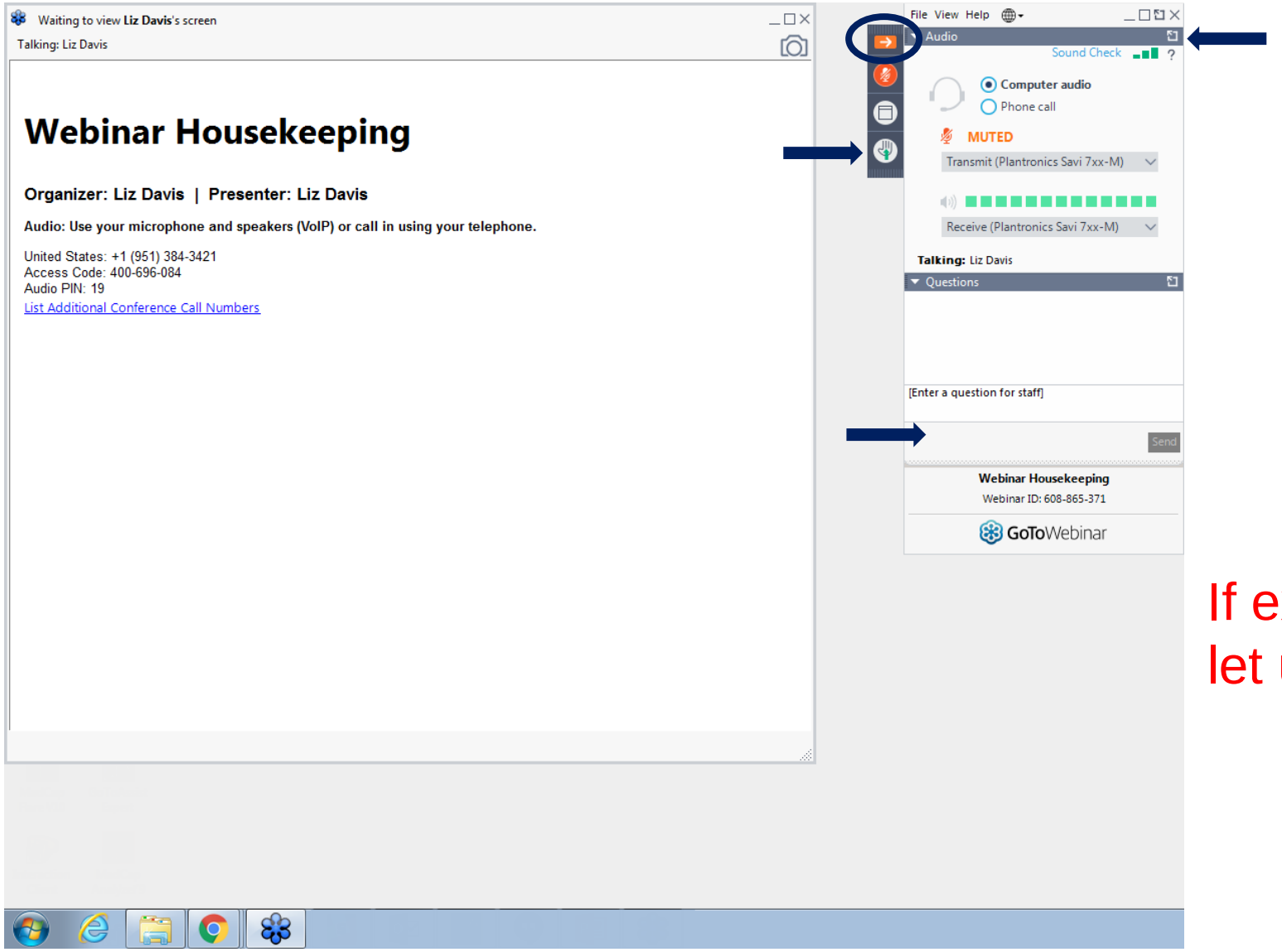


In session features

NELES



If experiencing audio issues please let us know in question field.

Speaker Introduction

- Joseph Bowab
- Butterfly Product Manager – North America
- 15 years of valve and actuator experience
- Bachelors degree in mechanical engineering

Agenda

- Neles Neldisc
  - Product Details
  - Features & Tools
  - Customer Challenges & Solutions
  - Competitor Info
  - Applications
- Contact us

Butterfly Valve Portfolio

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WS Series

Low-Moderate Temperature
Low dP
General/Clean Service
TSO / Bidirectional

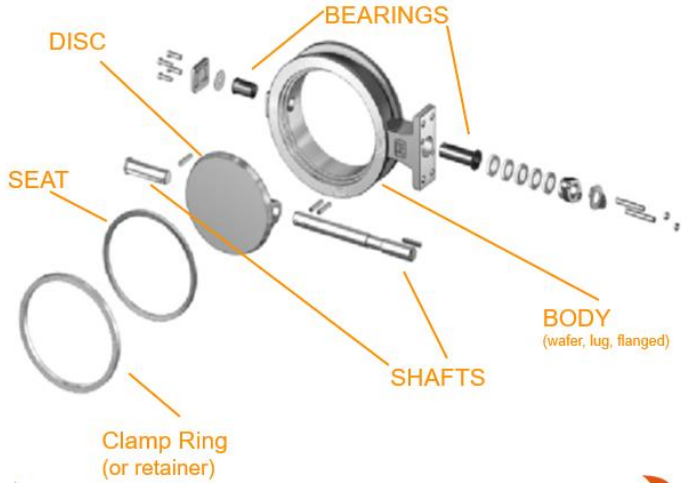
L Series

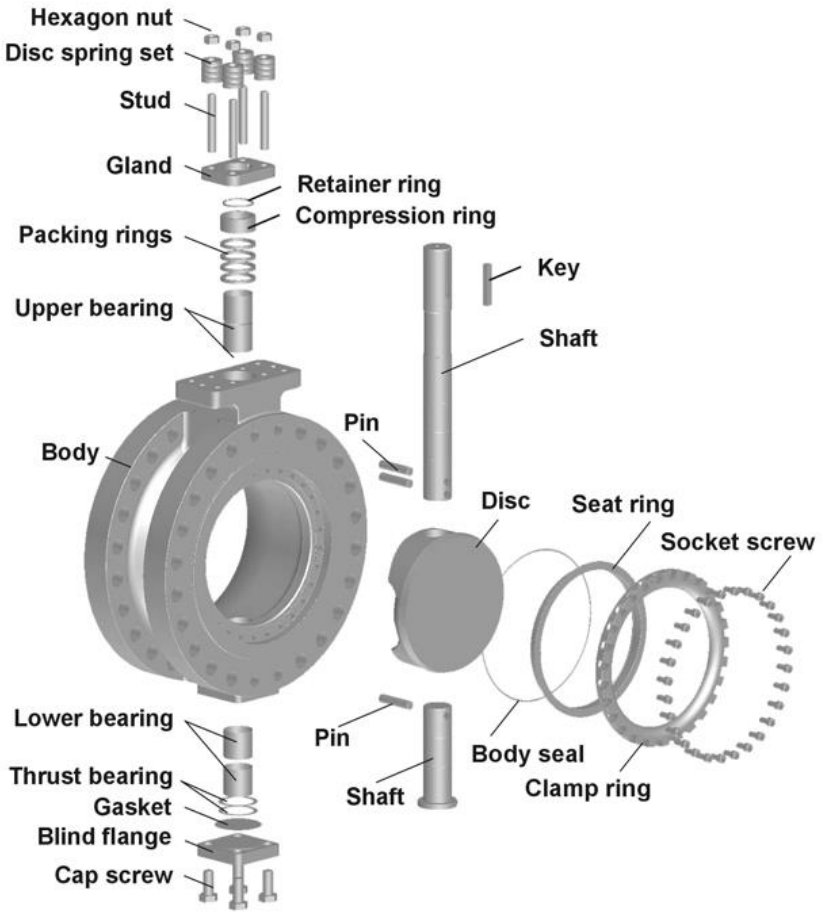
Low-High Temperature
Low dP
Dirty Service
High Velocity
TSO / Bidirectional

B Series

Low-High Temperature/dP
Variety of Services

Design/Construction Details





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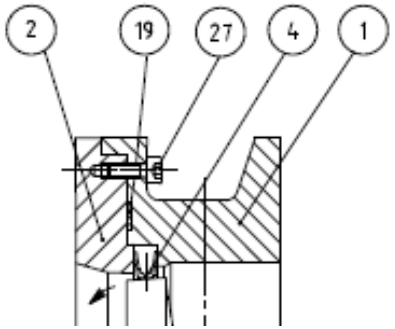
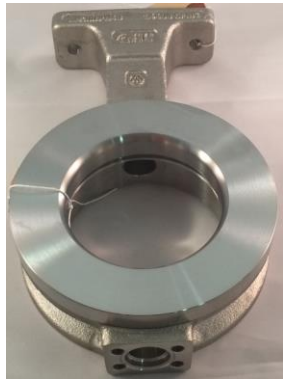
Details

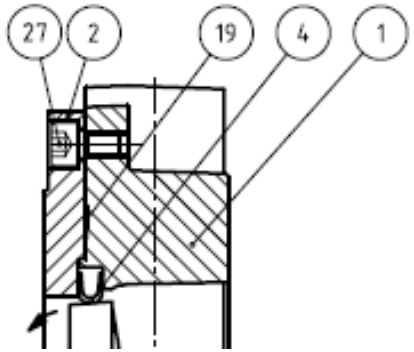
- Two piece shaft design
- Shaft bearings located top/bottom of disc
- Interchangeable components
- Wafer, lugged & double flanged
- All metal trim
- high alloys & hard-facings as standard

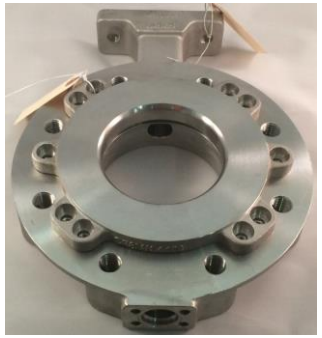
Design/Construction Details



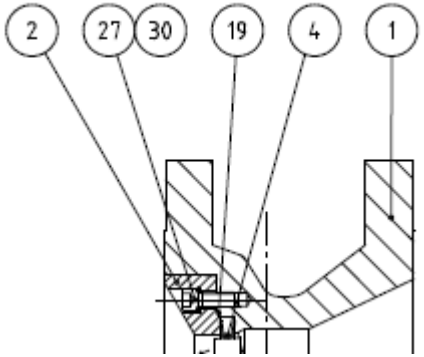


LW -Wafer

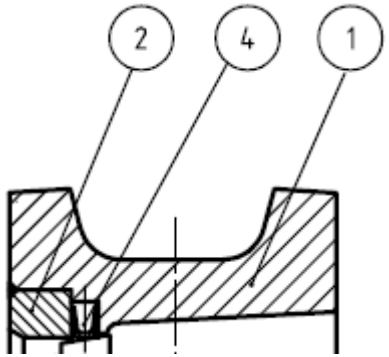




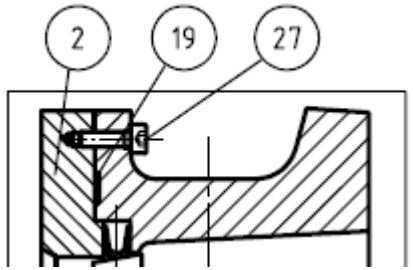
L1 Wafer & LG/L2-Lugged



L6 -Double Flanged



L12 =< 24” Welded



L12 28-40” Bolted

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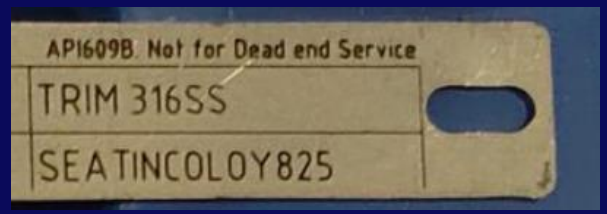
Insert Design

- Wafer
  - Cap screws located on back side of body flange, except small size L12
- Lugged
  - Cap screws located outside of valve body
  - Dead End service L6 =<24”

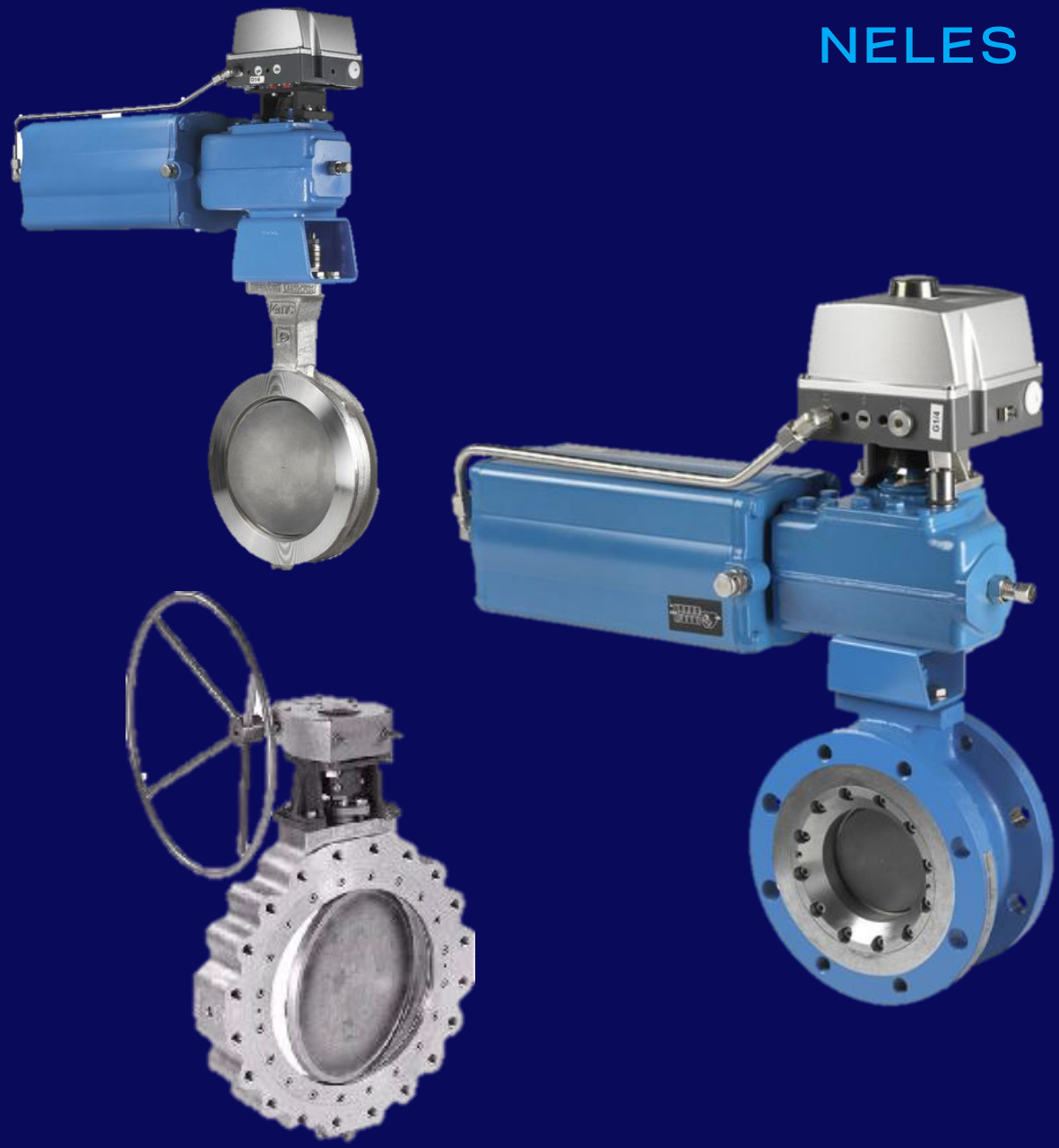


Finland Tag

Neles Neldisc

Typical challenges our customers face

- Safety, reliability and durability
- Inconsistent seal performance
- Increasing cycle life expectations
- Higher pressure/temperature range
- Higher capacity/plant efficiency
- Difficult to maintain
- Less maintenance intervals
- Complicated to automate/single source
- Limiting leak paths
- Safe tightness/emissions



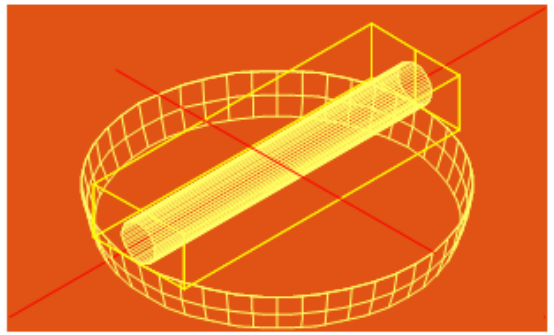
Market Challenges

Competitors

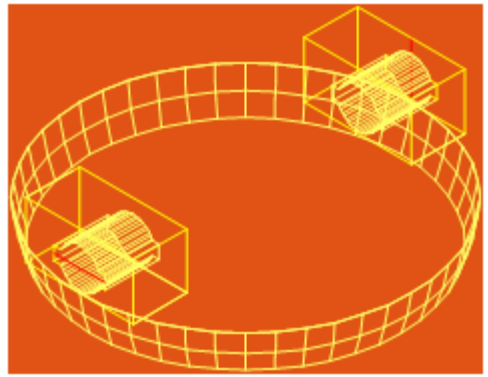
- Bray
- ABZ 6000 Series
- Vanessa Series 30,000
- Zwick
- ADAMS
- Tricentric
- Xomox 9000
- Fisher 8000/Control Disc

Designed for increased plant performance

- Neldisc has two piece shaft
  - Allows less material on disc, leading to more Cv
- Higher amount of flow with less pressure loss
- Thus use **optimum** (smaller) valve sizes
- Therefore reducing the installation costs
- Increased plant efficiency
- Competitors designs typically have single piece shaft
  - Shaft goes through disc



CONVENTIONAL SHAFT DESIGN



STUB-SHAFT DESIGN

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Challenge

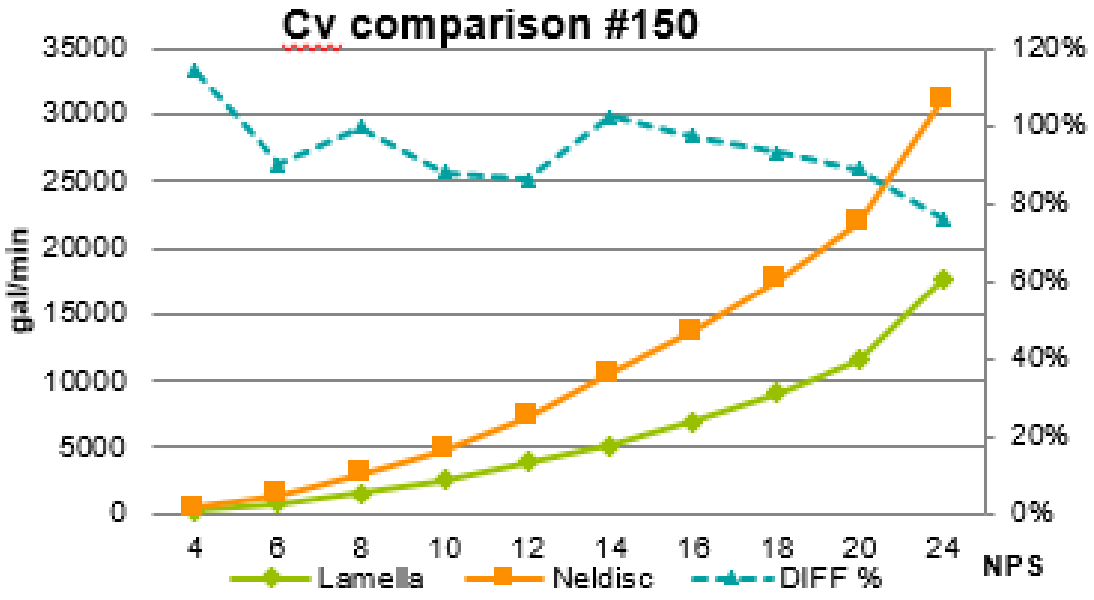
High capacity

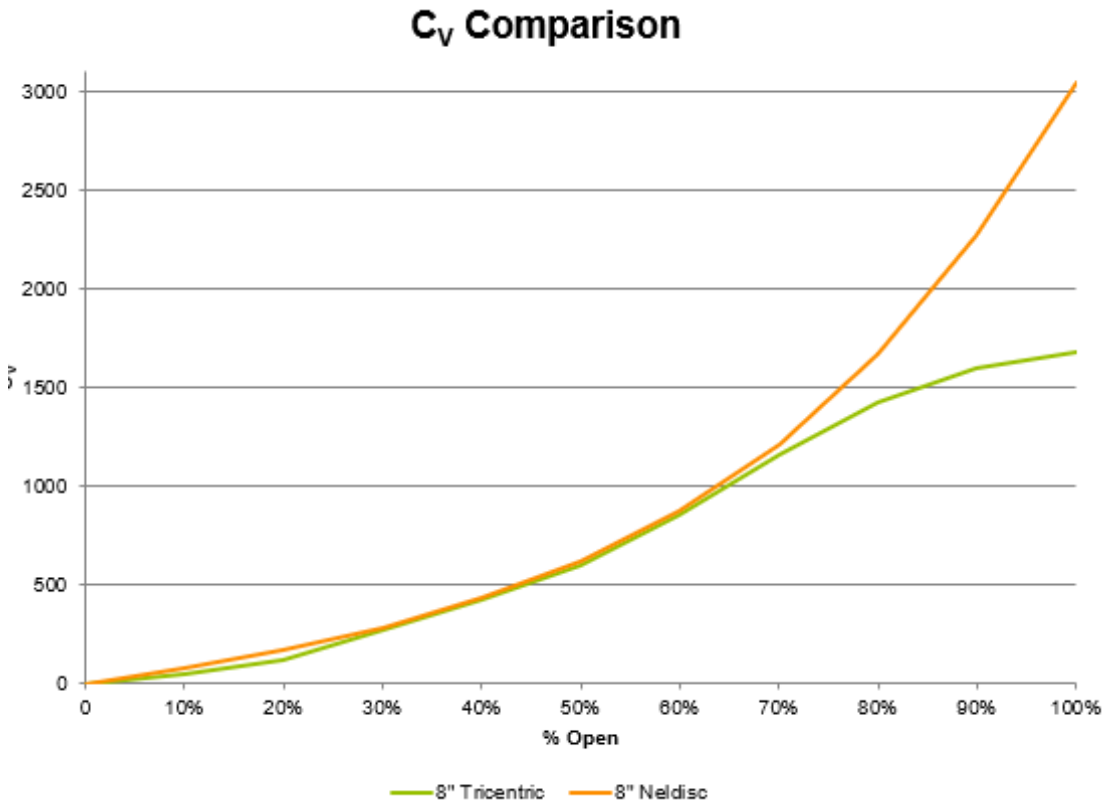
Plant efficiency

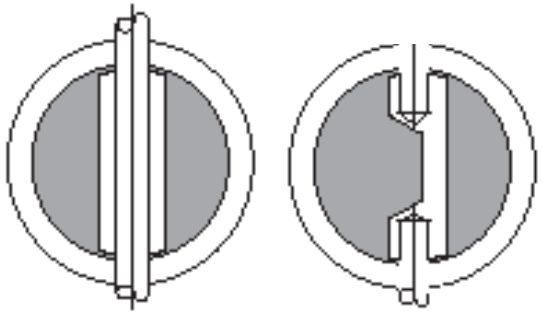
Solution

Two piece shaft

Designed for increased plant performance

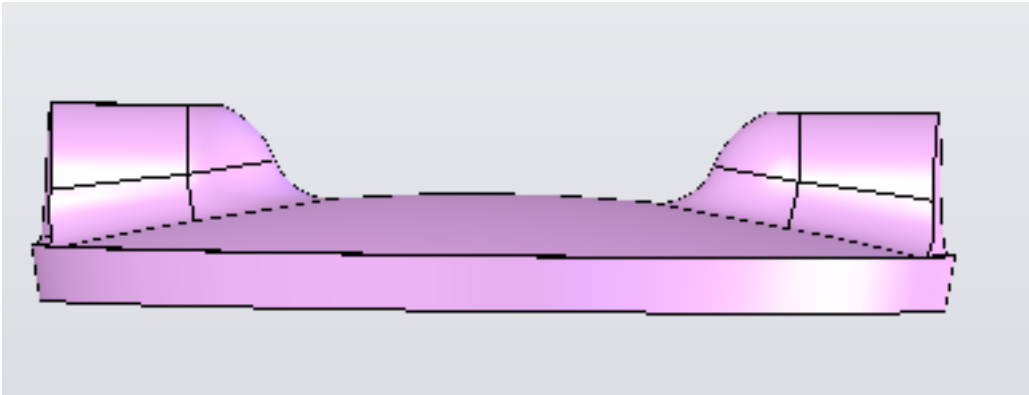


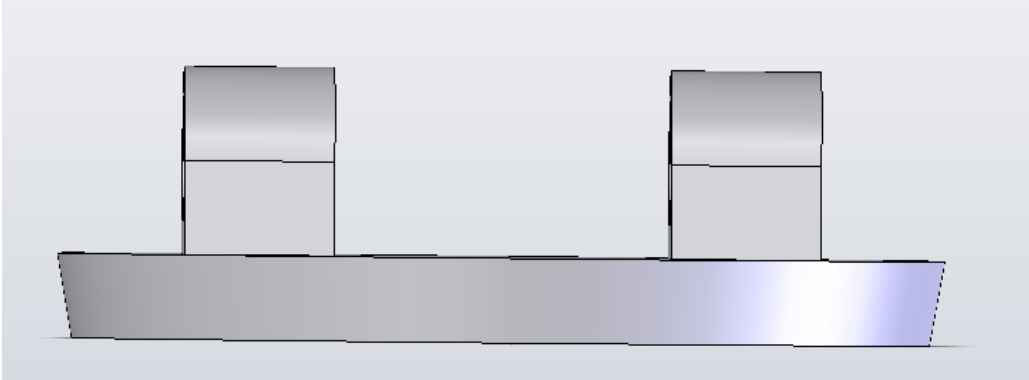




Designed for increased plant performance

- Strong disc – conical disc shape is the stronger design & ensures higher stiffness.
- One Shaft seat with high closing torques make stellite welding on disc/seat counterpart mandatory





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Challenge

High capacity

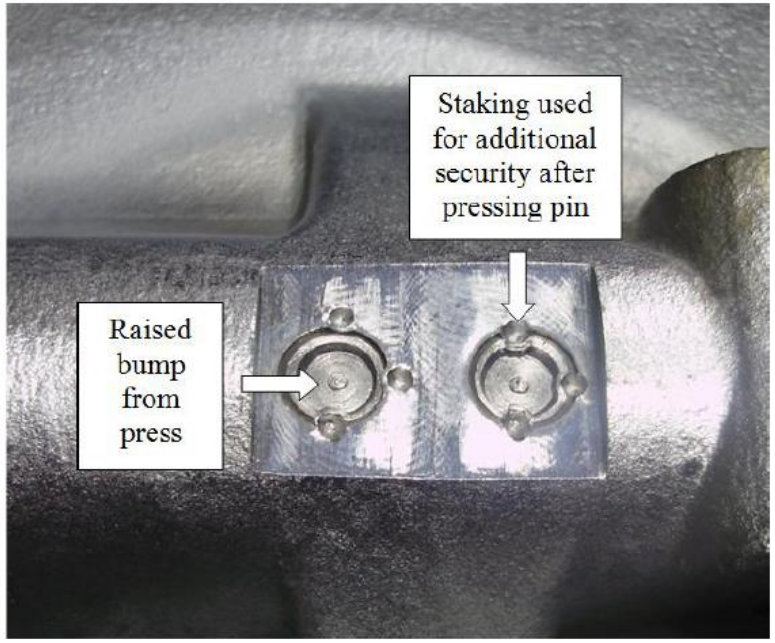
Plant efficiency

Solution

Conical disc design

Reliability, durable & extended lifecycle

- The material of pins, shaft and disc deforms during the pressing and this leads to strain hardening of the material.
- Pins expand when pressed, filling in gaps to prevent movement between surfaces
- Longer service life(2.5x)/less required maintenance intervals
- Pins must be drilled out for repair



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Challenge

Increasing cycle life expectations

Safety, reliability & durability

Less maintenance intervals

Solution

Pressed pins

Competitive Pinning Comparison

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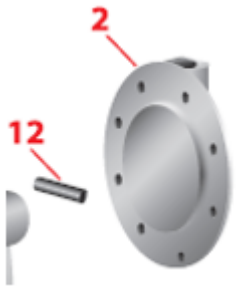
ABZ

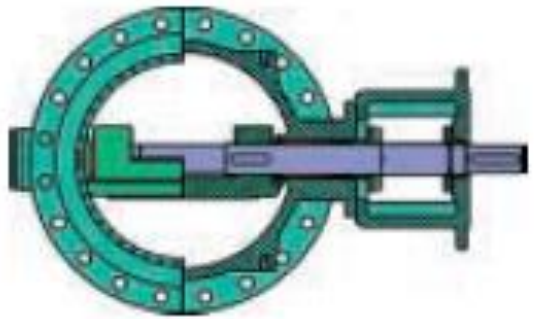


- One Tangential disc pin connection aligns the disc seal to the body seat.

ADAMS

- Keyed or splined connection

VANESSA



- Internal keyed and pinned connection.
- Shaft/disc was able to rotate 3-4 degrees after 20,000 cycles

BRAY

- Splined connection
- Ease of maintenance

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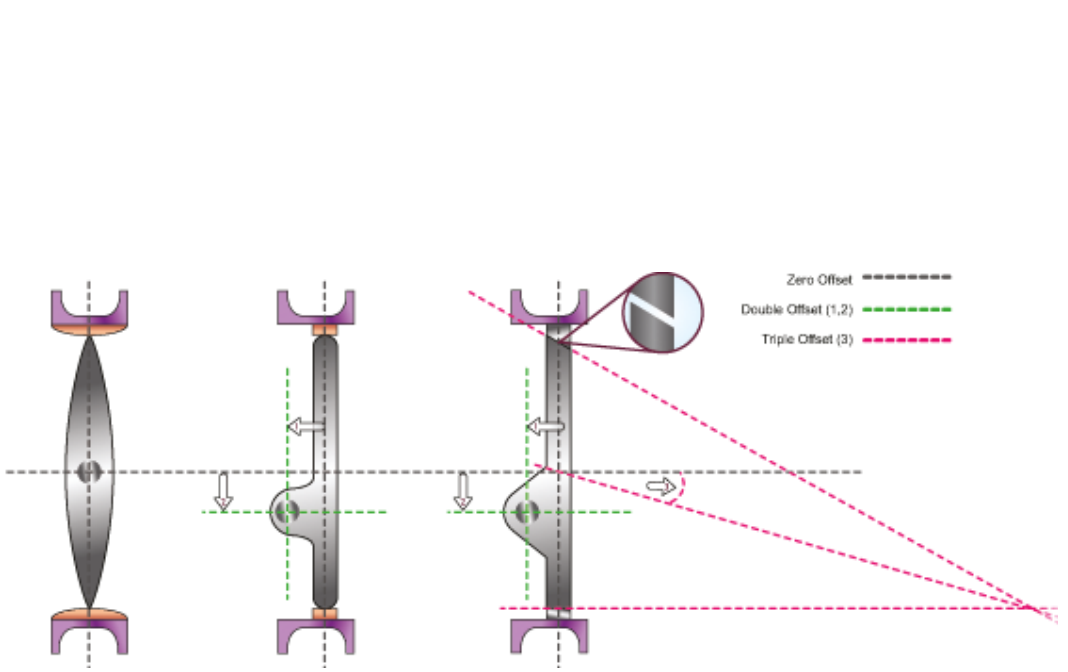
Questions?

Reliability, durable & extended lifecycle

- Oblique offset of sealing surface



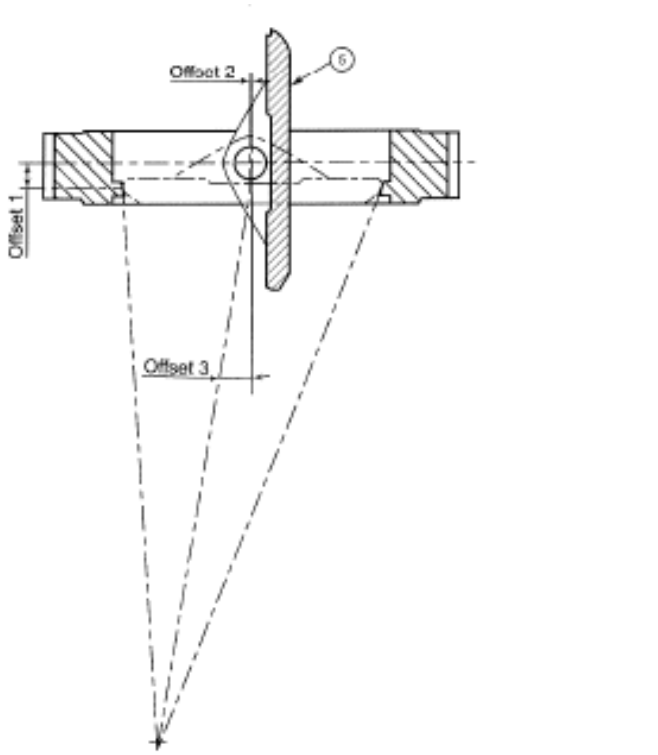


Figure C.4—Typical Triple Offset-type Construction (Category B)

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Challenge

Safety, reliability and durability

Inconsistent seal performance

Increasing cycle life expectations

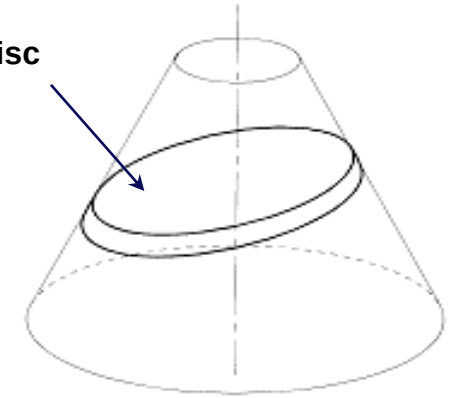
Solution

Patented triple offset design

Seal performance, reliability & extended lifecycle

- Elliptical disc from oblique cone slice
  - Allows eccentric disc rotation to transition into the seat

The disc represents an oblique slice through a cone which produces an elliptical shape and a unique profile on the sealing surface.



NELES

Challenge

Safety, reliability and durability

Inconsistent seal performance

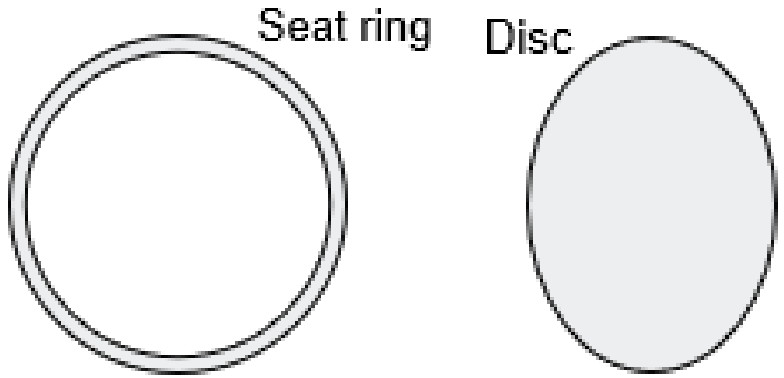
Increasing cycle life expectations

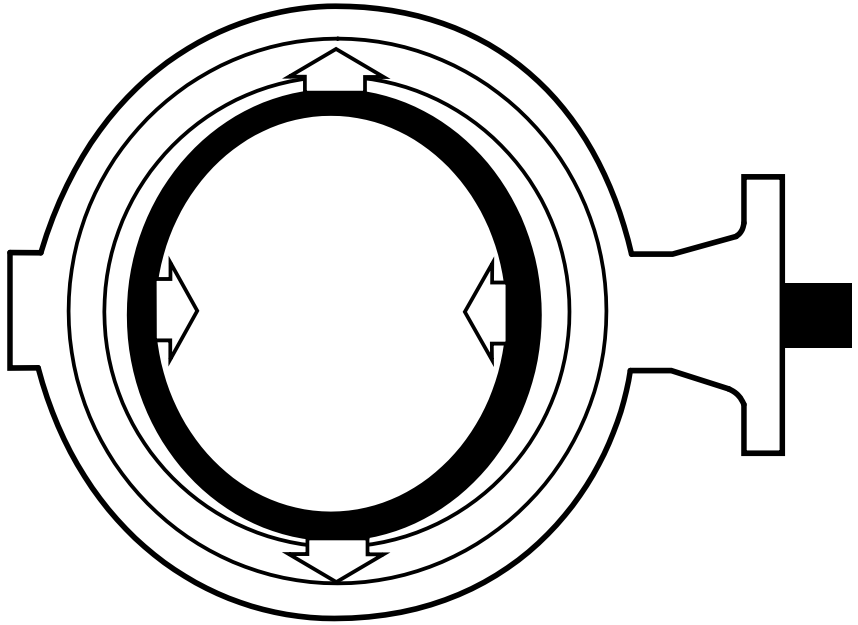
Solution

Patented triple offset design

Seal performance, reliability & extended lifecycle

- Seat ring conforms to disc
  - Self centers on disc
- Seat can move on a plane to accommodate disc well (self-alignment) and provide thermal compensation
- Repeatable performance
- Valve performance keeps stable, reliable and long lasting tightness.





NELES

Challenge

Safety, reliability and durability

Inconsistent seal performance

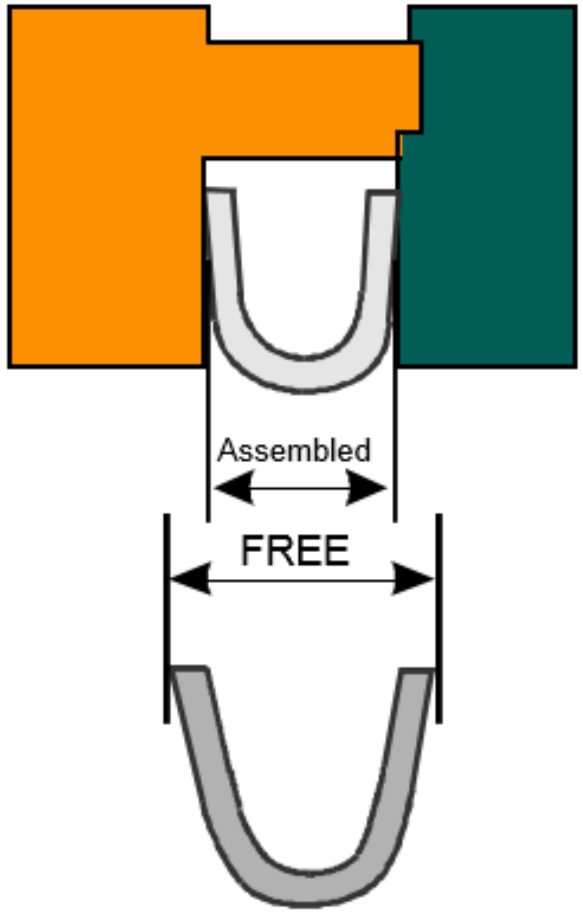
Increasing cycle life expectations

Solution

Patented triple offset design

Seal performance, reliability & extended lifecycle

- Solid floating metal seat ring
- Seat coated without any resilient parts
- No media build up on or behind seat
- Ability to handle abrasive and dirty service
- High flow velocity possible
- Guarantee against changing operational conditions – pressure/temperature changes
  - Laminated seats can lock up in temperature changes.



NELES

Challenge

Safety, reliability and durability

Inconsistent seal performance

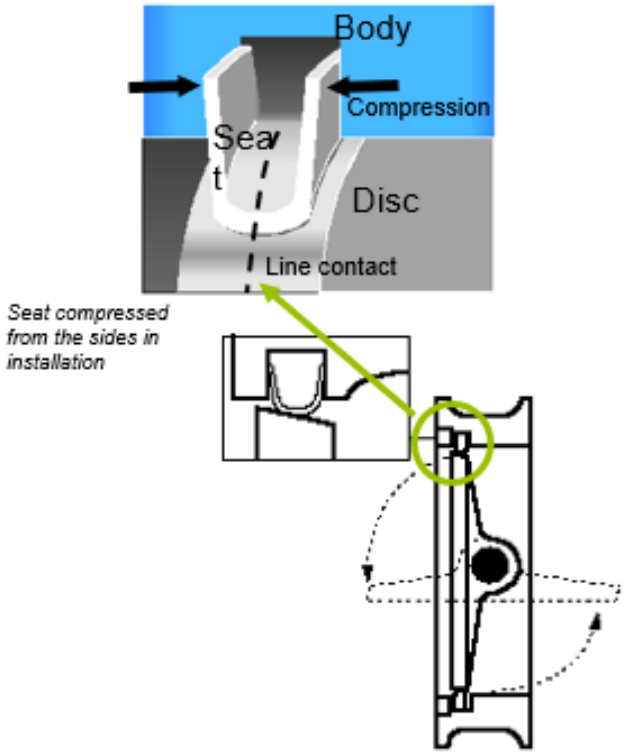
Increasing cycle life expectations

Solution

All-metal, single-piece floating U seat

Seal performance, reliability & extended lifecycle

- Mechanically induced sealing
  - No need for differential pressure to seal
- Line contact between disc and seat
  - Precise line contact between seat and disc generates a realiable performance of the materials
  - No sliding wear on components
- Contact only when seated



NELES

Challenge

Safety, reliability and durability

Inconsistent seal performance

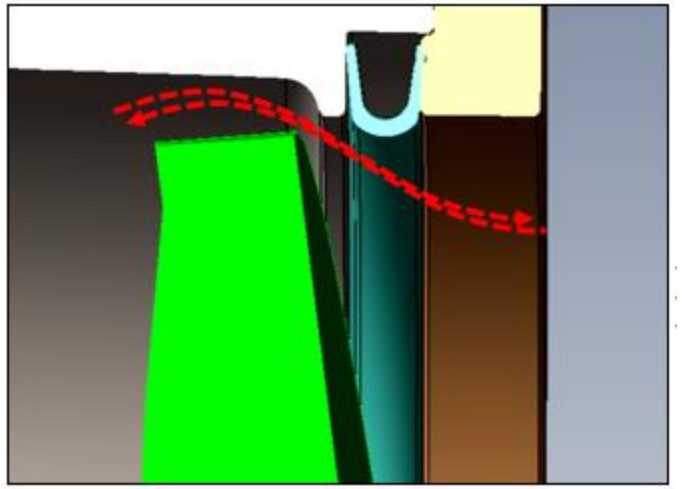
Increasing cycle life expectations

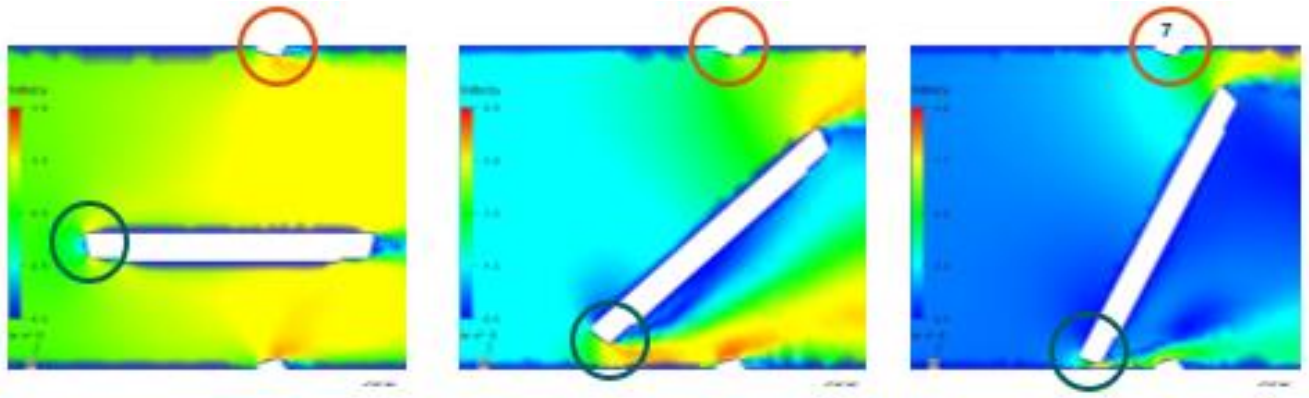
Solution

All-metal, single-piece floating U seat

Seal performance, reliability & extended lifecycle

- Seat ring “hidden”: protected of the seat in area of lowest wear & tear





Challenge

Safety, reliability and durability

Inconsistent seal performance

Increasing cycle life expectations

Solution

Protection of seat and sealing element

Seal performance, reliability & extended lifecycle

- Advantage of torque seated design: adjustable tightness
  - More actuator torque results into higher seat compression and therefore eliminating the leaking gaps
  - Sealing force obtained from closing torque
- Advantage of position seated full metal seat: less torque required, long lasting performance
  - 40% less torque required for Neldisc design,
    20% less weight for valve + actuator package
  - Smaller actuator, lower pipe stress, fast cycling, lower vibration
- In Neldisc butterfly valve the combination of both ensures long lasting performance, best thermal resistance, reduced wear & tear, safety & fast closing.

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Challenge

Safety, reliability and durability

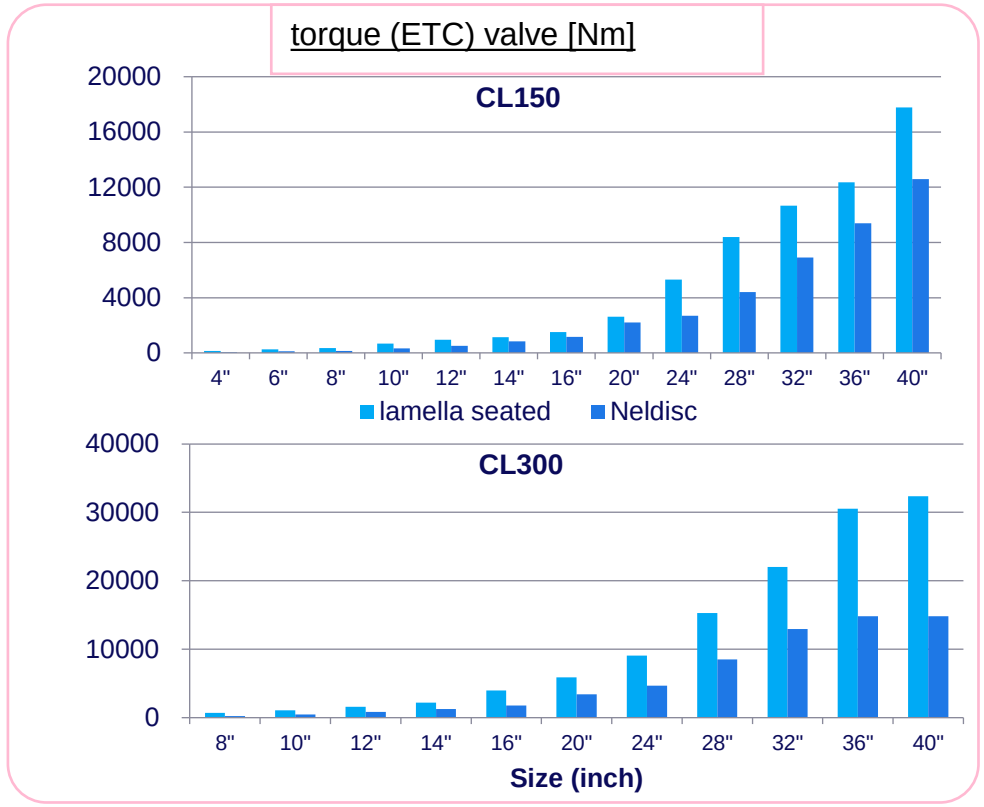
Inconsistent seal performance

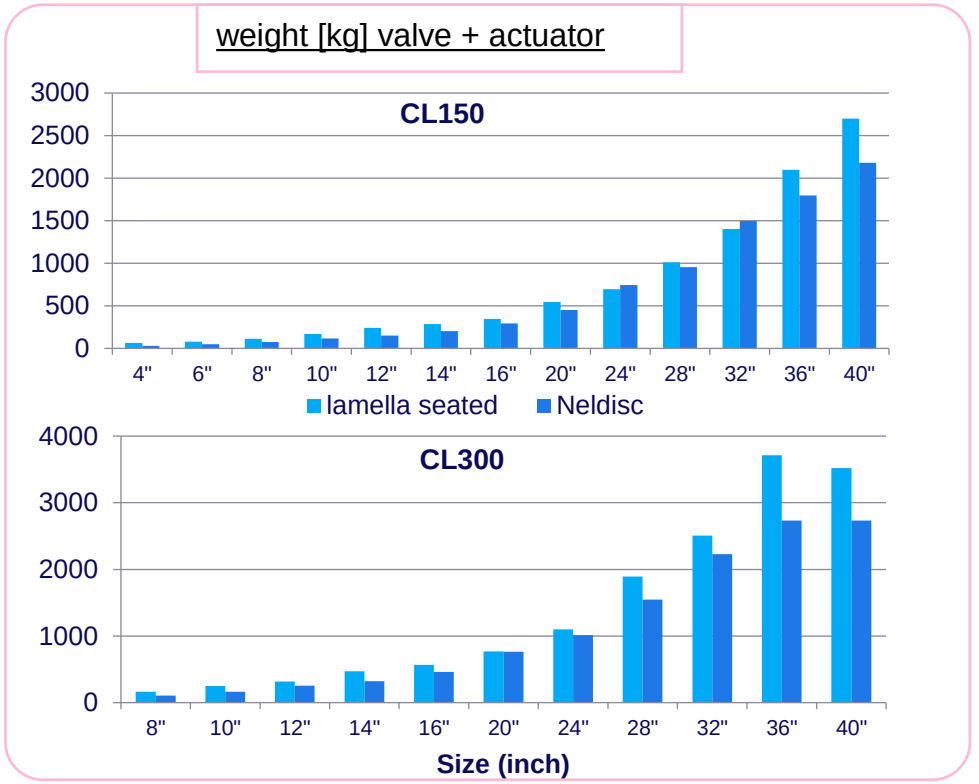
Increasing cycle life expectations

Solution

Combination of **torque and position seated design**

Seal performance, reliability & extended lifecycle





Applications - Seat Materials

NELES

LW/LG & L1/L2 seat selection up to 24”

SEAT CODE	SEAT MATERIAL	WHEN TO USE	COMMENT
A	**Incoloy 825, hard chrome plated** T = 200 ˚C ... + 500 ˚C, (NACE MR 0103)	Always 1st choice. Is suitable in 90% of cases. Comparable for stellited seat construction of lamella seated valves.	-Lowest cost -STD offering
H	**Nimonic 80A (UNS N07080), hard chrome plated** T = 200 ˚C ... + 650 ˚C (not NACE)	Only high temp use, above + 500 ˚C	-Very high cost -In most cases IQI
K	**W. No. 2.4681, UNS R31233 (ULTIMET)** T = 200 ˚C ... + 600 ˚C, (NACE MR 0103)	Corrosive fluids like acids (also weak), sea water etc. When hard chromium is not suitable. Rate A tightness. Not for NACE MR 0175.	-High cost but very good corrosion performance -In most cases IQI

L1/L2 seat selection 28” & larger

SEAT CODE	SEAT MATERIAL	WHEN TO USE	COMMENT
B	**W. No. 1.4418, hard chrome plated** T = 200 ˚C ... + 400 ˚C, (not NACE)	1st choice for all big sizes. Suitable in 90% of such cases.	-Lowest cost -STD offering
H	**Nimonic 80A (UNS N07080), hard chrome plated** T = 200 ˚C ... + 650 ˚C (not NACE)	Only high temp use, above + 500 ˚C	-Very high cost -In most cases IQI
K1	**UNS S 32750, nickel plated (ENP)** T = 30 ˚C ... + 315 ˚C, (NACE MR 0103)	Use only in sea water or similar	-Very high cost -In most cases IQI
D	**F6NM, hard chrome plated** T = 75 ˚C ... + 425 ˚C, (NACE MR 0103)	Use only when NACE requirement exists, also for NACE MR 0175	-Reasonable cost in NACE -In most cases IQI

Applications - Seat Materials

NELES

L6 seat selection

SEAT CODE	SEAT MATERIAL	WHEN TO USE	COMMENT
A	**Incoloy 825, hard chrome plated, valve size 4" – 30" (internals 24")** T = 200 ˚C ... + 500 ˚C, (NACE MR 0103)	Always 1st choice. Is suitable in 90% of cases. Comparable for stellited seat construction of lamella seated valves.	-Lowest cost -STD offering
B	**W. No. 1.4418, hard chrome plated, valve size 32" and bigger** T = 200 ˚C ... + 400 ˚C, (not NACE)	1st choice for all big sizes. Suitable in 90% of such cases.	-Lowest cost -STD offering
H	**Nimonic 80A (UNS N07080), hard chrome plated, valve size 4"– 64" (64" is max internal size)** T = 200 ˚C ... + 650 ˚C (not NACE)	Only high temp use, above + 500 ˚C	-Very high cost -In most cases IQI
K	**W. No. 2.4681, UNS R31233 (ULTIMET) ULTIMET), valve size 4" – 30" (internals 24")** T = 200 ˚C ... + 600 ˚C, (NACE MR 0103)	Corrosive fluids like acids (also weak), sea water etc. When hard chromium is not suitable. Rate A tightness. Not for NACE MR 0175.	-High cost but very good corrosion performance -In most cases IQI
K1	**UNS S 32750, nickel plated (ENP), valve size 32" – 48"** T = 30 ˚C ... + 315 ˚C, (NACE MR 0103)	Use only in sea water or similar	-Very high cost -In most cases IQI
D	**F6NM, hard chrome plated, valve size 32" and bigger** T = 75 ˚C ... + 425 ˚C, (NACE MR 0103)	Use only when NACE requirement exists, also for NACE MR 0175	-Reasonable cost in NACE -In most cases IQI

Designed for reliable seal performance

Air (low pressure) Seat Leakage

- ISO 5208(according to table)
  - **Default for all metal seated butterfly valves Rate D**
  - Rate C as optional (8%-36%); WM T1
  - Rate B as optional (4%-18%); E#
  - Rate A available (12%-53%); WM T7
    - L-series requires K-seat(Ultimet);not avialable for L6F/E or L12 up to 24”
    - No coating on disc allowed
- ANSI/FCI 70-2
  - Class III & Class IV(WM T4) as default
  - Class V & VI optional (8%-36%); WM T5, T6
- API 598 WM T8
  - Optional (8%-36%)

	ISO5208				API 598	ANSI/FCI 70-2			
	Rate D	Rate C	Rate B	Rate A		Class III	Class IV	Class V	Class VI
LW/LG	All	All	3"-40"	3"-24"	3"-40"	All	All	All	All
L6	All	All	3"-46"	3"-30"	3"-46"	All	All	All	All
L12	All	On request*	On request*	N/A	On request*	All	All	All	On request*
L1/L2	All	All	18"-40"	18"-24"	18"-40"	All	All	All	All

No adder

Price adder

NOTE: Listed tightness levels to both directions for L series.
* L12 on request starting from 28” and larger size.

Designed for reliable seal performance

Water (High pressure) Seat Leakage

- ISO 5208
  - Rate D optional (4%-18%)
  - Rate C optional (8%-36%)
  - Rate B to preferred direction only (10%-44%)
  - Rate A not available
- ANSI/FCI 70-2
  - Class IV optional (2%-7%)
  - ClassV optional (4%-18%)
- API 598
  - optional (10%-44%)
- L-series non-preferred direction dp up to
  - 40 bar(580 PSI) for CL300,
  - 16 bar(232 PSI) for CL150

	ISO5208				API 598	ANSI/FCI 70-2	
	Rate D	Rate C	Rate B	Rate A		Class IV*	Class V*
LW/LG	All	All	3"-40"**	N/A	3"-40"	All	All
L6	All	All	3"-46"**	N/A	3"-46"	All	All
L1/L2	All	All	18"-40"**	N/A	18"-40"	All	All
L12	All	N/A	N/A	N/A	N/A	N/A	N/A

*Tested with process design pressure

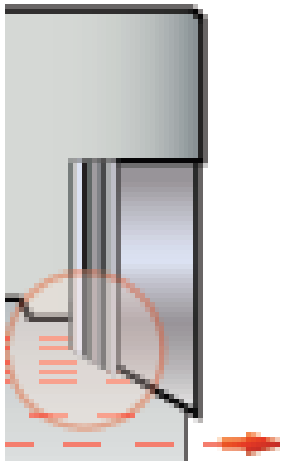
**To preferred direction only

NOTE: L-series non-preferred side dp limitation

Disc Seal Competitive Analysis

NELES

ABZ



Metal Seat Design:

- Machined metal seat, free floating, Uni-Directional, pressure Assisted seal
- ABZolute 400 Series metal seated valves are rated full ANSI pressure
- API 607 Fire Safe tested
- Class V Uni-Directional shut off

Note: Soft and Fire Safe Seated valves are rated for full vacuum. Valves in vacuum service must be installed with vacuum on upstream side of valve. (Retainer side)

- Laminated located in body
- Metal seat available in double offset design

Principle of Sealing

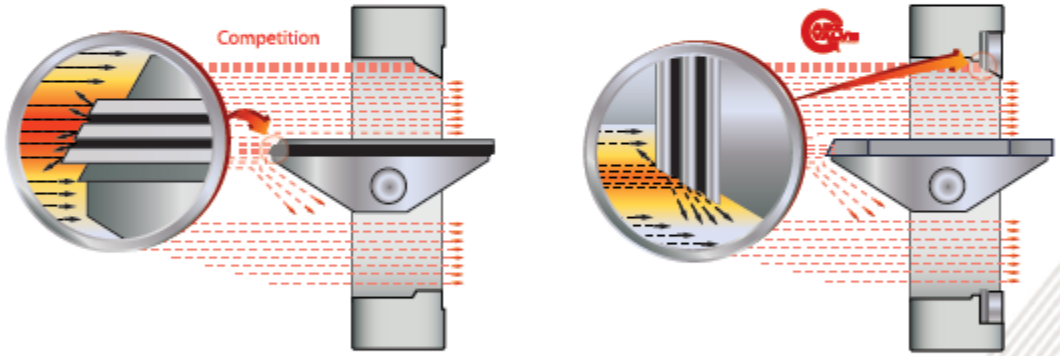
The basic sealing principle of a Triple off valve is to utilize a conical seating system. Many valve designs have an integral seat to the valve body and a laminated disc seat located directly in the path of the flow media. The ABZ "body seat design" the laminated seat is located in the body and the solid seal is secured to the disc. Direct exposure to flow is reduced to any laminate surfaces. This unique ABZ design allows for field replaceable body seal and disc seat without special tools.

Competitors Disc Seat Design

- Laminated disc seat are susceptible to flow erosion. (Replaceable)
- Solid seal is integral to the body. (Non-replaceable)

ABZ Body Seat Design

- Laminated body seat are indirect to flow and less susceptible to erosion. (Replaceable)
- Solid disc seal (Replaceable)

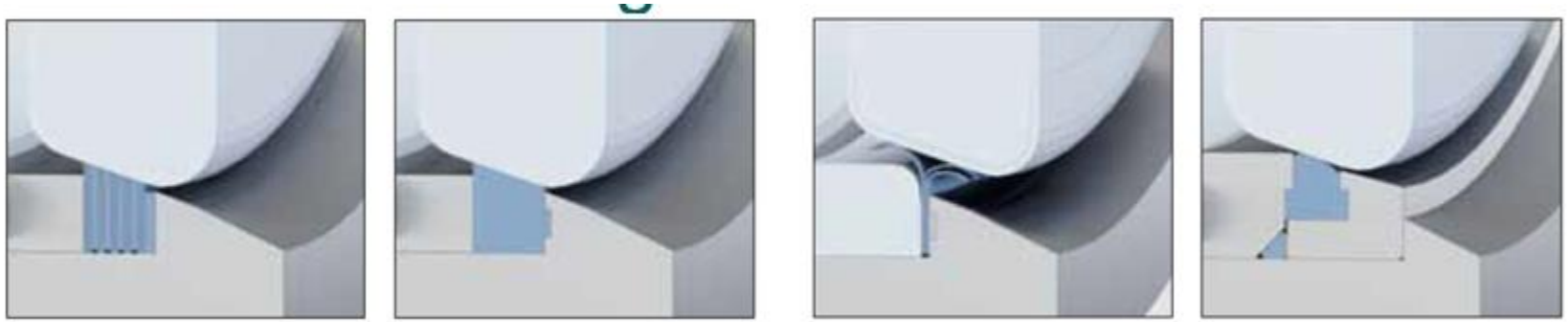


	Disc Seat Deign (Competition)	Body Seat Design(ABZ)
Body Seat	Integral welded	Laminate Metal+Graphite
Disc Seat	Laminate Metal+Graphite	Solid Metal
Seat Replacement	Disc Seat only	Both Disc & Body Seat
Friction of Laminate Seat	High	Low

Disc Seal Competitive Analysis

NELES

ADAMS

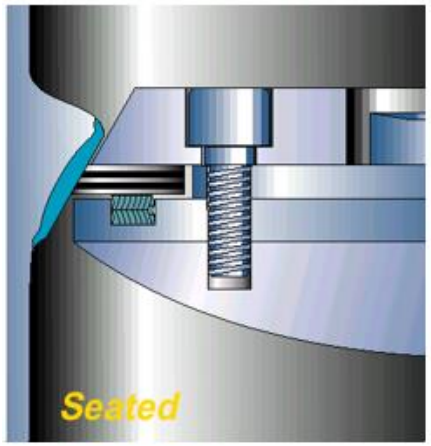


- Laminated located in body
- Flexible metal Class VI
- Solid metal for abrasive/high temp service

Disc Seal Competitive Analysis

NELES

VANESSA



- Laminated located in disc
- Standard hard-facing in body
- Screws in flow path
- Solid metal available

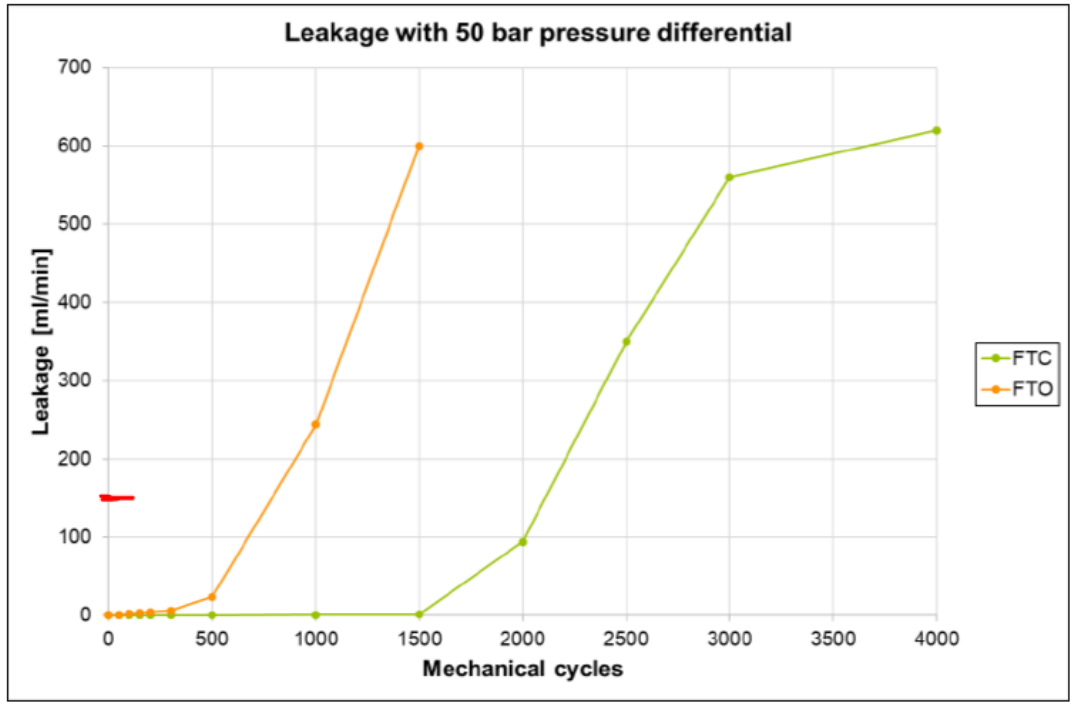


Figure 4. Leakage test results during endurance test with 50 bar pressure differential.

High Pressure test

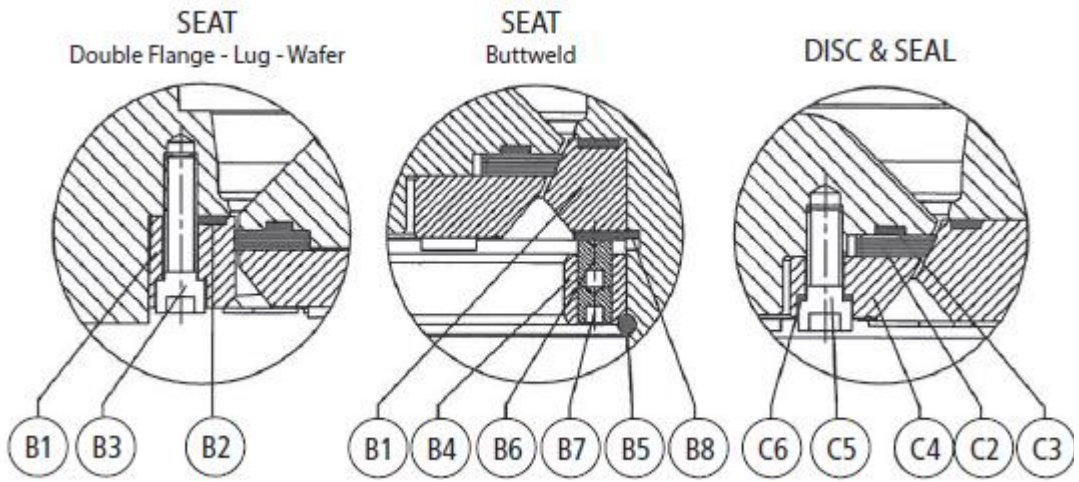
- FTC after 2000 cycles leakage was 10 times Rate G. Test was stopped at 5000 cycles, where the leakage was over 1000 ml/min.
- FTO after 100 cycles leakage was Rate D and after 300 cycles was over Rate G. Leakages to FTO-direction could not be measured with full dP after 2000 cycles done.
- BTO torque increased 4X over 5000 cycles
- Pieces of graphite were missing
- 3”, 6”, 8” & 12” tested with similar results
- 12” had thrust bearing and bearing areas of the shaft were worn

Disc Seal Competitive Analysis

NELES

BRAY

- Laminated located in disc
- Screws in flow path
- Nitrided 316SS seat is bolted into the body
- Metal seat available in double offset design



Item	Description
A1	Body
B1	Body seat (replaceable)
B2	Seat Gasket
B3	Seat Cap Screws
B4	Seat Retainer
B5	Seat retainer ring
B6	Seat Lower Dowel Fastener
B7	Seat Upper Dowel Fastener
B8	Seat Alignment Button
C1	Disc
C2	Seal ring
C3	Disc Seal Gasket
C4	Seal Ring Retainer
C5	Seal Ring Retainer Cap Screws
C6	Seal Ring Retainer Washers
C7	Disc Spacer

Maintenance Complexities

Seat and Sealing Element Maintenance

- Laminated/Solid Seat requires significant steps for assembly or maintenance.
  - Lubricant (light mineral oil) required between disc and gasket…damage control
    - For Solid Seat Lubricant (light mineral oil) required between disc and seal ring
  - Two different methods to install the seal ring onto the disc…difficult to follow
  - Also two different methods to install the retaining ring onto the disc…difficult to follow
  - Lock washers and Loctite required to complete retaining ring assembly
    - *Screws must be perfectly cleaned prior to Loctite application*
  - Seal ring needs to be verified by hand without rotating it.

9 Apply a thin film of lubricant on the surface area of the disc (9) where seal ring (12) and spiral wound gasket (11) will be located (lubricant should be in accordance with Table IV).

Caution

Apply only a thin film of lubricant where indicated. Failure to do so will hinder the assembly and may cause damage to the valve.

10 Assemble the new spiral wound gasket (11) in the disc groove, without forcing and taking care not to damage it.

11 Replace seal ring (12) on the disc through the shaft side of the body. To properly locate the seal ring, there are two different solutions:

- solution 1 - ref. to figure no. 6a - align the internal slot of the seal ring (12) to the reference pin (10).
- solution 2 - ref. to figure no. 6b - align the reference mark (C) on the seal ring (12) with the relevant reference mark (D) on the disc.

12 Assemble the seal retainer ring (13). There are two different solutions as per previous point 11:

- solution 1 - ref. to figure no. 6a: make sure that the slot on the edge of the seal retainer ring (B) is in correspondence with reference pin (10).
- solution 2 - ref. to figure no. 6b: ensure to locate the hole (E) of the seal retainer ring with the relevant marks on the disc (D) and seal ring (C).

13 Hand tighten all the fastening screws (15), with relevant lock washers (14) after applying Loctite® 270 or equivalent on the bottom side of the threads (they have to be perfectly cleaned with solvent before applying Loctite®). Then, verify that the seal ring can be moved freely by hand without rotating it.

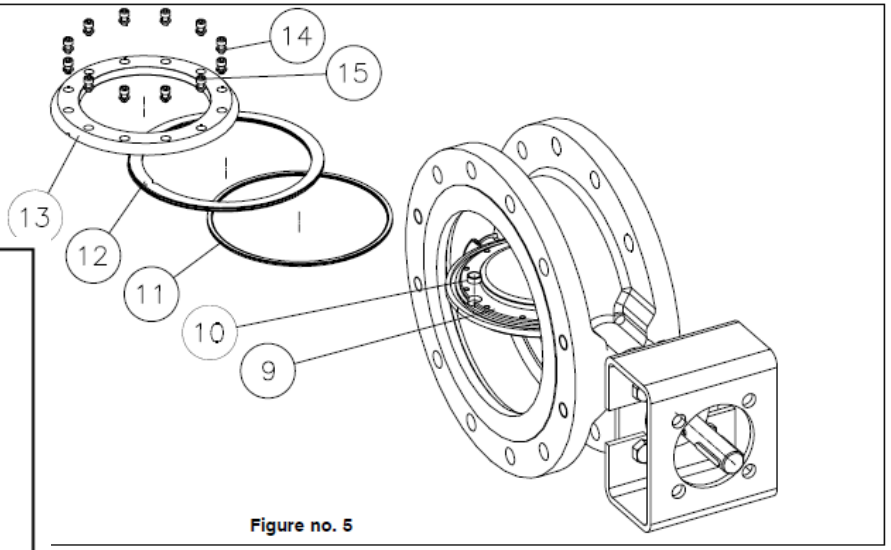


Figure no. 5

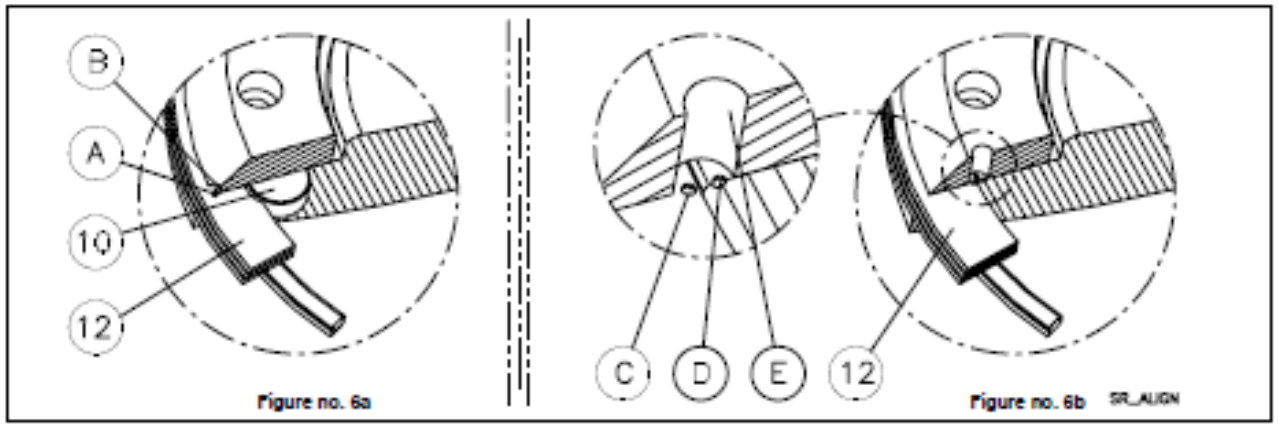


Figure no. 6a

Figure no. 6b SR_ALIGN

Maintenance Complexities

Seat and Sealing Element Maintenance

- Laminated/Solid Seat requires significant steps for assembly or maintenance cont.
  - Seating & unseating required after
  - Valve must be in closed position while (2) screws are tightened to avoid seal ring movement.
  - Open valve a few degrees and tighten all screws using (2) different solutions
    - *Torque values differ depending on solution used!*
    - *8mm - Solution 1 recommends 9 ftlb, solution 2 recommends 15 ftlb*
    - *24 mm - Solution 1 recommends 257 ftlb, solution 2 recommends 339 ftlb*
  - Confirm seal ring is aligned with the retainer ring. If not aligned screws must be loosened and several steps needs to be repeated.
  - Confirm seal ring is aligned with disc. If not aligned screws must be loosened and several steps needs to be repeated.

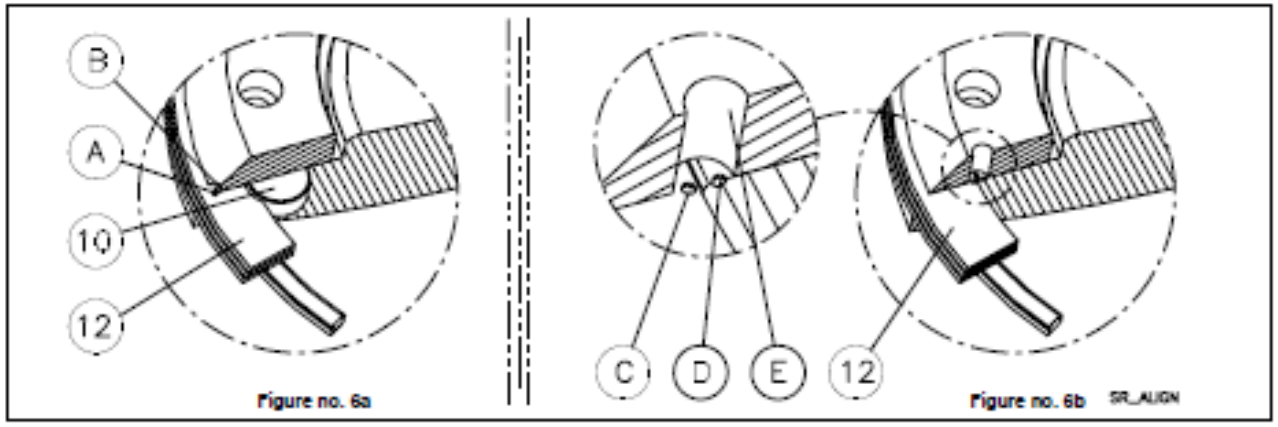


Figure no. 6a

Figure no. 6b SR_ALIGN

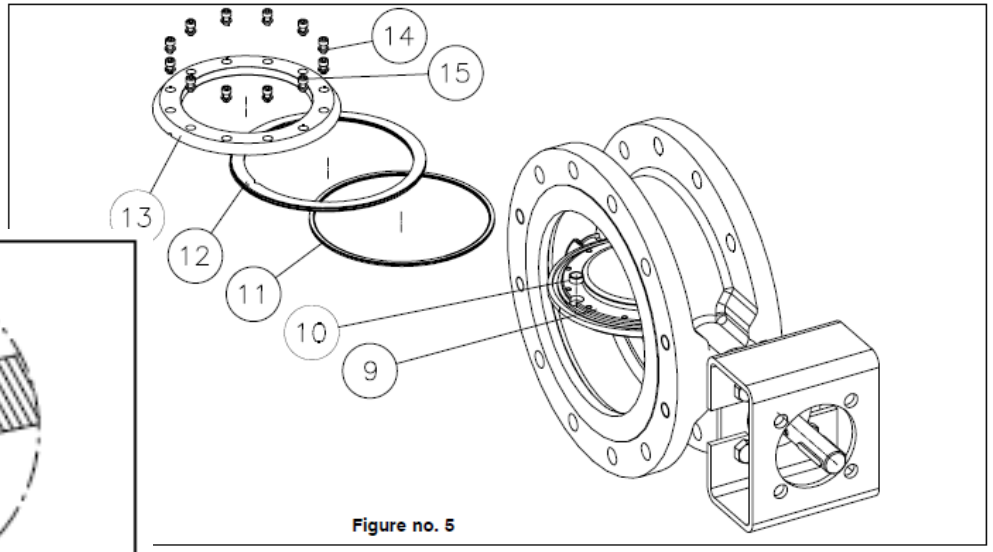


Figure no. 5

•Solution 2 - ref. to figure no. 6b:

The seal ring and the disc are completed with two reference markings, (C) and (D). After the complete assembling, verify that both markings can be seen through the hole (E) of the seal retainer flange. The two markings have to be perfectly aligned.
If not visible or not aligned, loose the retaining screws, re-align the index markings and start again the procedure from point 12.

14 Apply a thin film of lubricant to the body seat (only when valve has a solid seal ring) and to the external edge (sealing conical surface) of the seal ring (12). Lubricant should be in accordance with Table IV.

15 Seat and unseat the valve twice.

16 Keep the valve in the closed position without applying torque. Tighten at least two retaining screws (15) to avoid the seal ring moving from the position found.

17 Open the disc a few degrees and tighten, using a torque wrench, all screws (15). Use a torque value from Table III for valves according to solution 1 (ref. to figure no. 6a). Use instead a torque value from Table II for valves according to solution 2 (ref. to figure no. 6b). It is recommended to use the crossover method to tighten all retaining screws.

Important

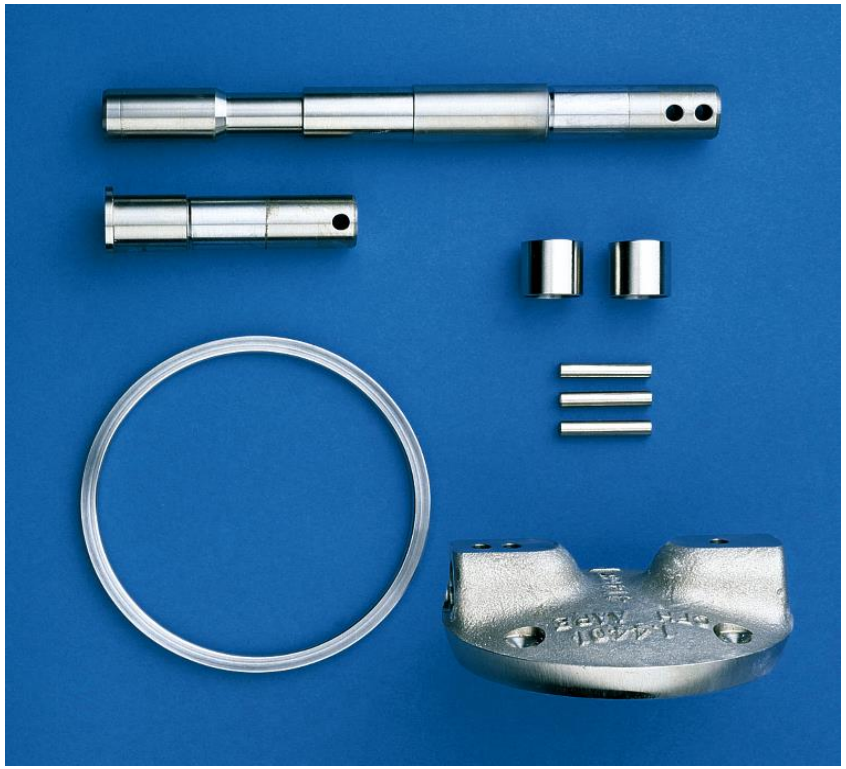
•Solution 1- ref. to figure no. 6a:

The seal ring is supplied with an index marking (A). After the complete assembling, verify that the index marking (A) can be seen in the slot (B) of the seal retainer flange. Slot (B) and marking (A) have to be perfectly aligned.
If not visible or not aligned, loosen the retaining screws, re-align the index marking and start again the procedure from point 12.

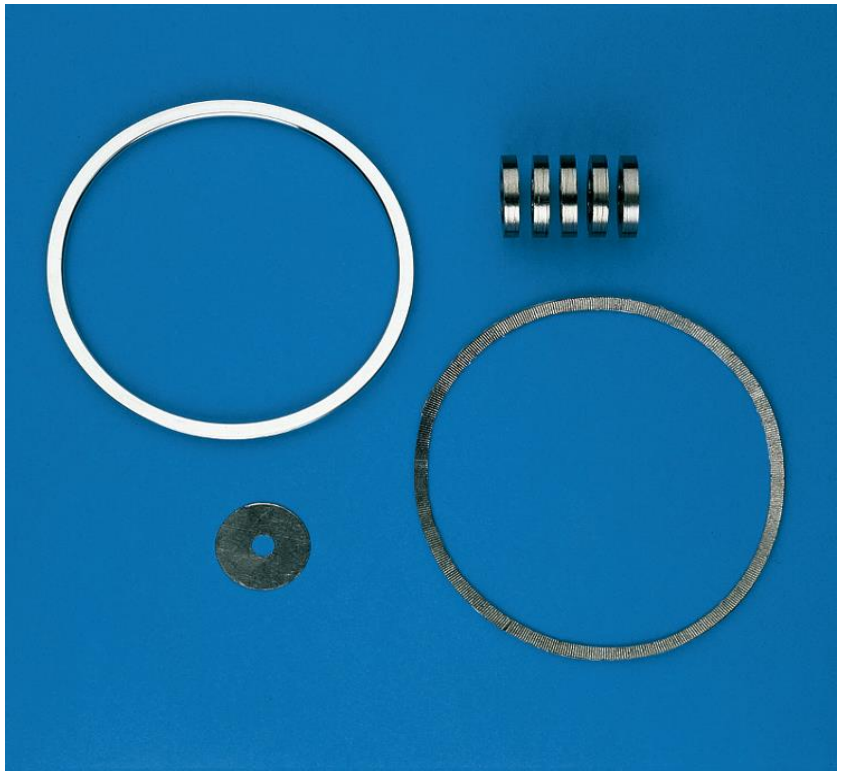
Designed for easy service and maintenance

NELES

Less maintenance – fewer parts



Trim components



Spare parts

Challenge

Difficult to maintain and service

Less maintenance intervals

Solution

Robust but simplistic design

Less reliable & durable, inconsistent seal performance and reduced cycle life expectations

NELES

Disc Seal Competitive Analysis

- Seat can be installed in disc or body
- Higher torques are required to seal with this seat design (larger actuator required)
- Seat design requires multiple actuator stop adjustments to maintain sealing
- Overtime sealing requires additional actuator torque.
  - Larger actuators needed
  - Sticking, ceasing can occur
- Replacement challenges
  - The laminated seat requires a disc and retainer flange, which when assembled together hold in the seal ring (ANSI 316 or Duplex)
- Graphite layers sensitive to dirty media, abrasive slurries or high-velocity flow resulting in disintegration.
- LNG service has degraded graphite layers

Designed for easy service and maintenance

- Maintains constant compression on packing gland while packing relaxes
- PTFE for standard service
- Graphite for Fire Safe & extended/ high temperature
- X construction required for ISO 15848

X	**LOW EMISSION** - Emission graphite packing - Emission blind flange - Emission blind flange bolting gr. 660 (CF8M body) / L7M (WCB body) - Otherwise as construction "N" **NOTE ! Please check current certification coverage from Sales Hub link.**

NELES

Challenge

Difficult to maintain and service

Less maintenance intervals

Limiting leak paths

Solution

Live Loading / Emissions performance

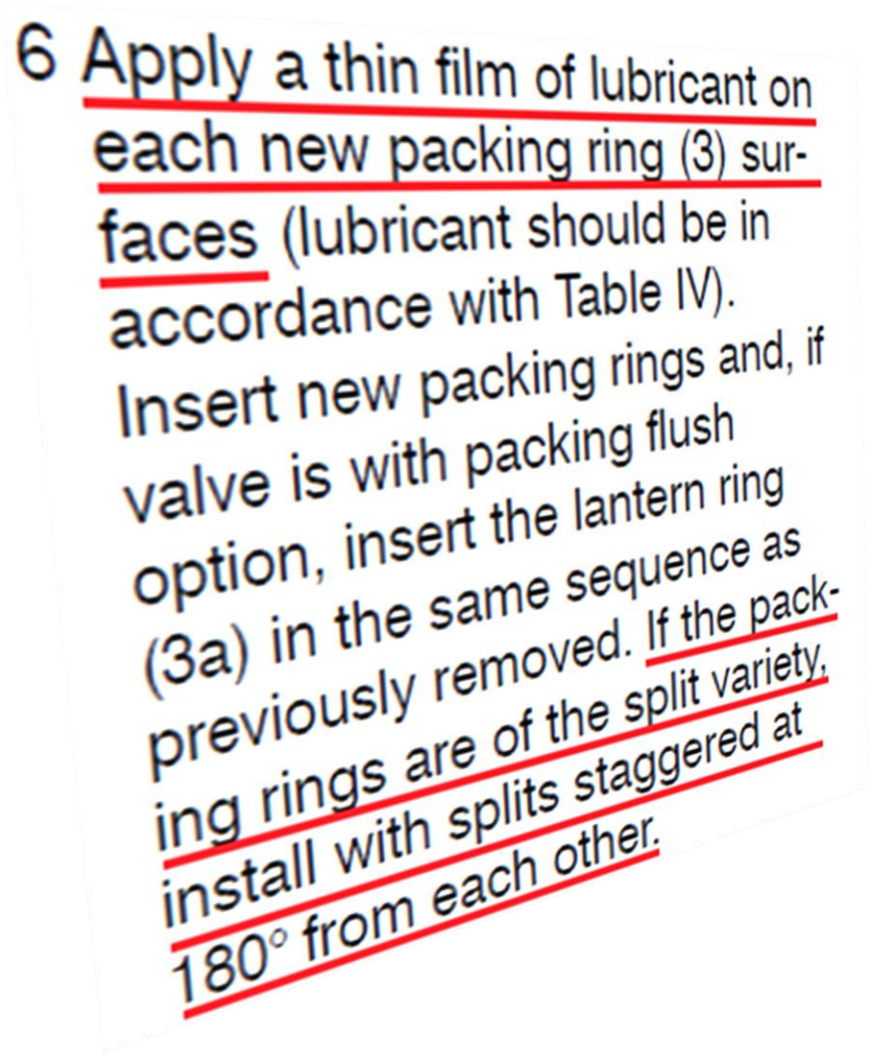
Maintenance complexity and potential leak paths

Lubricant required

- Vanessa requires a thin film of lubricant(light mineral oil) on each packing ring…adding complexity to the assembly/maintenance process
- *Does the lubricant aid in sealing ability?*

Split Packing Rings

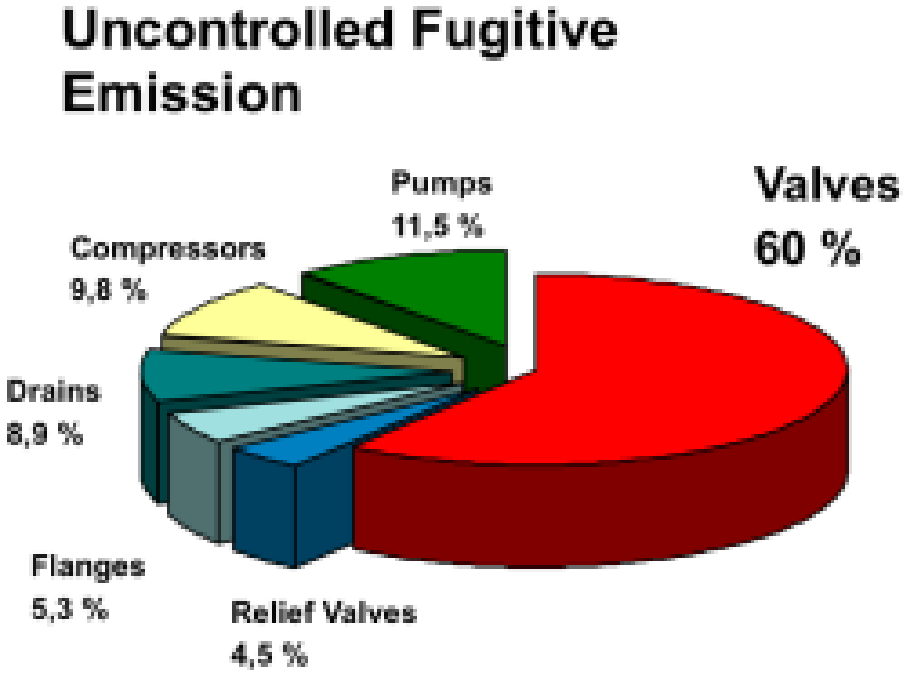
- Neldisc uses solid circular V-rings
- Parts are close fitting, eliminating need for carbon fiber top ring. Avoiding potential problems from incorrect assembly
- Split packing rings require carbon fiber top ring to prevent extrusion through gaps and clearances
- Split packing provides additional internal leak paths through the packing

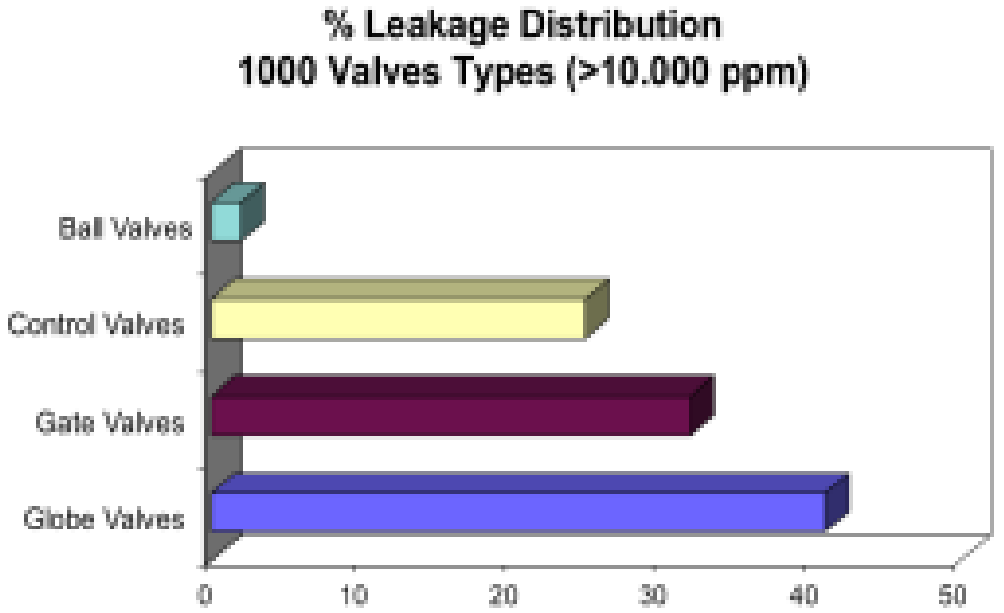

6 Apply a thin film of lubricant on each new packing ring (3) surfaces (lubricant should be in accordance with Table IV). Insert new packing rings and, if valve is with packing flush option, insert the lantern ring (3a) in the same sequence as previously removed. If the packing rings are of the split variety, install with splits staggered at 180° from each other.

Rotary vs Reciprocating for Emission Requirements

NELES

- Standard rotary design provides better emission control than standard reciprocating design





- 60% of all fugitive emission was related to valves. The main leak-source is the stem seal.
- Out of 1000 valves leaking more then 1% (10 000 ppm) only 2% was ball valves, 24% control valves, 32% gate valves and 42% globe valves(98% linear).

Less reliable & durable, inconsistent seal performance, reduced cycle life expectations and complex maint.

NELES

Selling Strategies

- Reduced C_v
  - Depending on the size, Neldisc can have 20-50% more C_v
- Poor control valves
  - Typical control range for laminated design 20% / 30%-70% open
  - Neldisc control range 10% - 80%
- Weighs more
  - Makes installation more difficult
  - Neldisc weighs as much as 30% less
- “Zero-Leak” can not be maintained (API 598 no cycle requirement)
  - Seat prone to excessive leakage within 30,000-50,000 cycles
- Valves can not handle high temp/high cycle applications well - 450C(842F)
  - Construction “A” to 500 ˚F, Construction “N” to 806 ˚F, Construction “H” to 1100 ˚F
- Competitor’s valves have more torque to seat the disc
  - Larger actuation on the competitors valves
- Complex maintenance procedure/significant component count – Neldisc has solid disc/seat

NELES

Questions?

Designed for easy automation

- Key or square
  drive suitable for of a variety of gear operators and actuators
- Single source supplier for
  valves, actuators, instrumentation

NELES

Challenge

Ease of automation

Solution

Single source/easy mounting and fixing of valve assembly components

Designed for easy automation

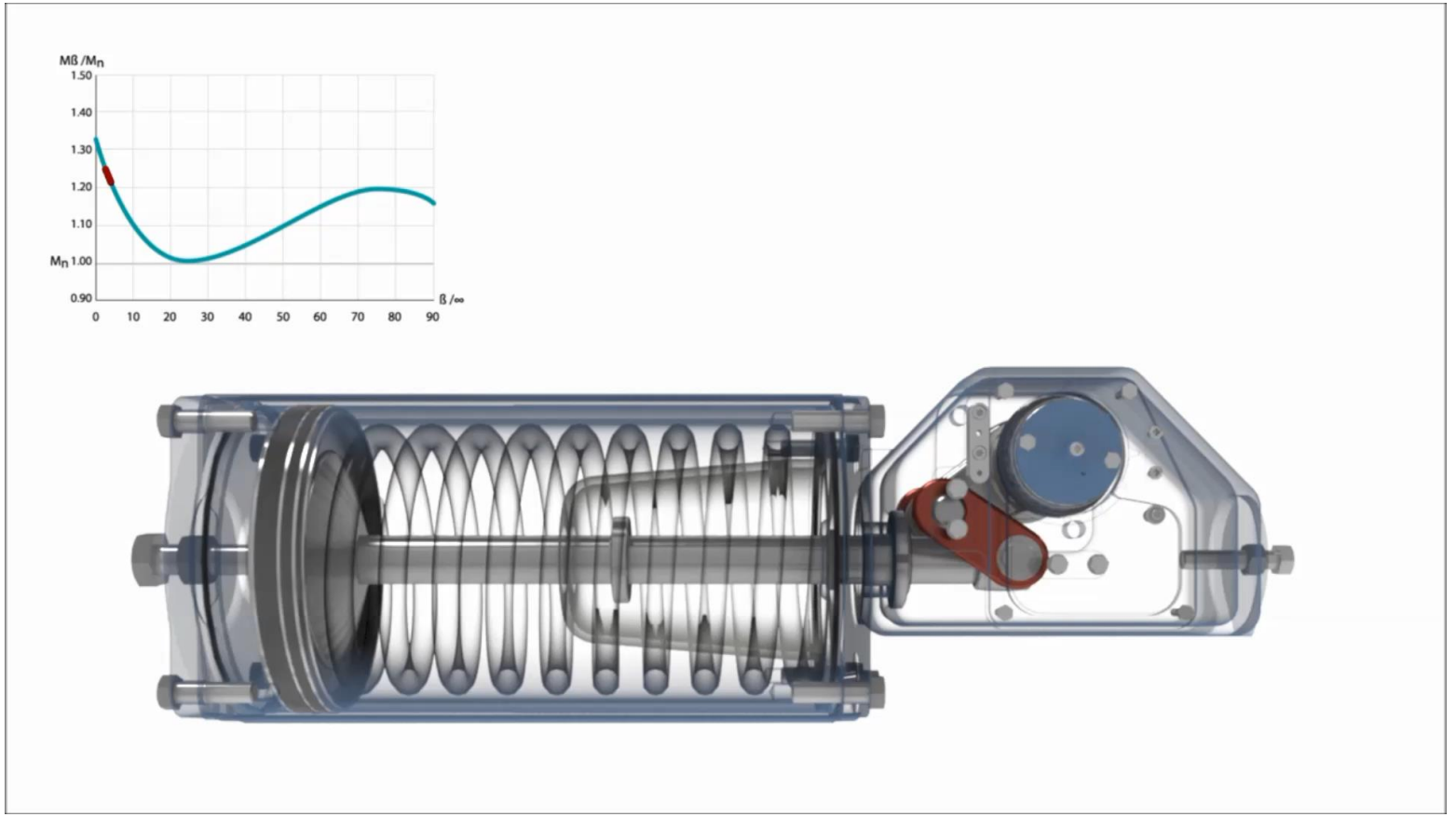
NELES

Valv-Powr™

Quadra-Powr™

B SERIES

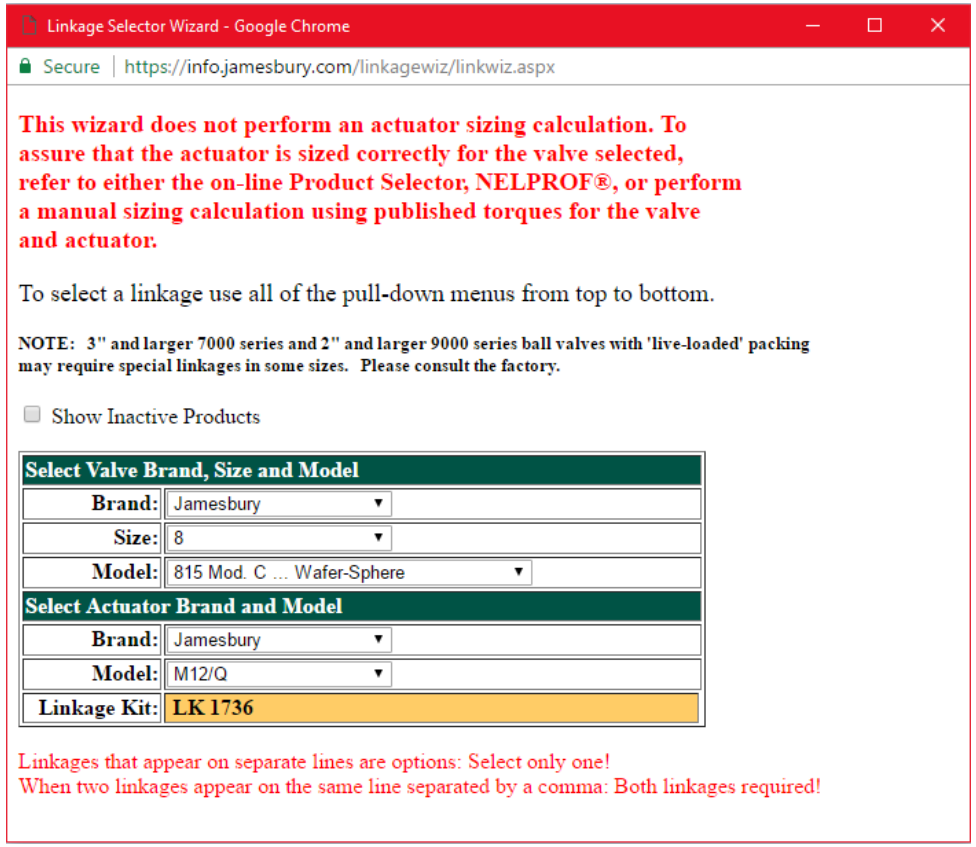
B1J - Single Acting Fail Close



Designed for easy automation

NELES

- Nelprof to determine valve/actuator
- Linkage Kit assigned
  - Linkage Wizard



Challenge

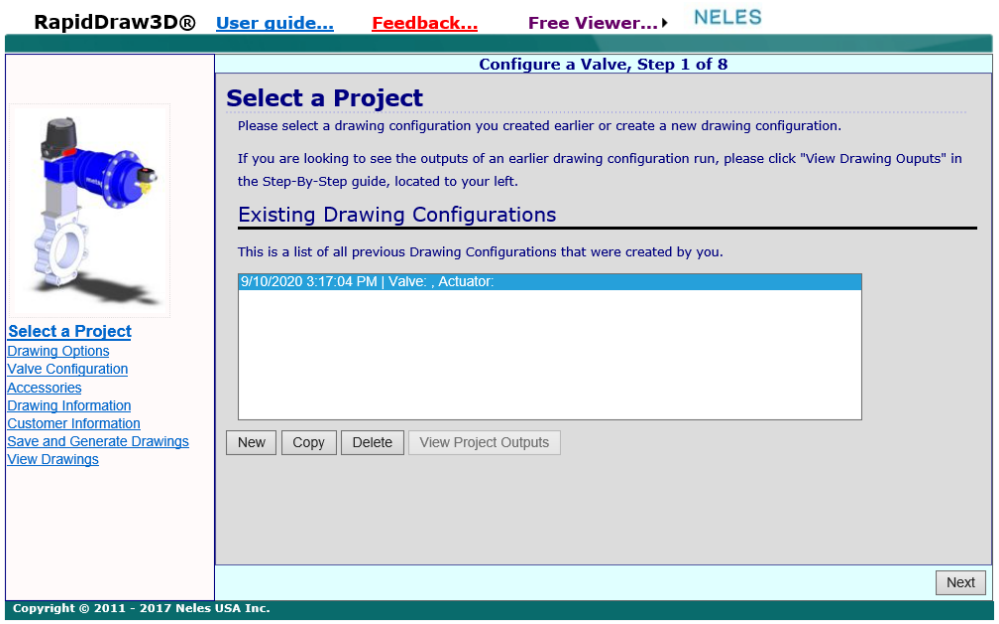
Ability to automate

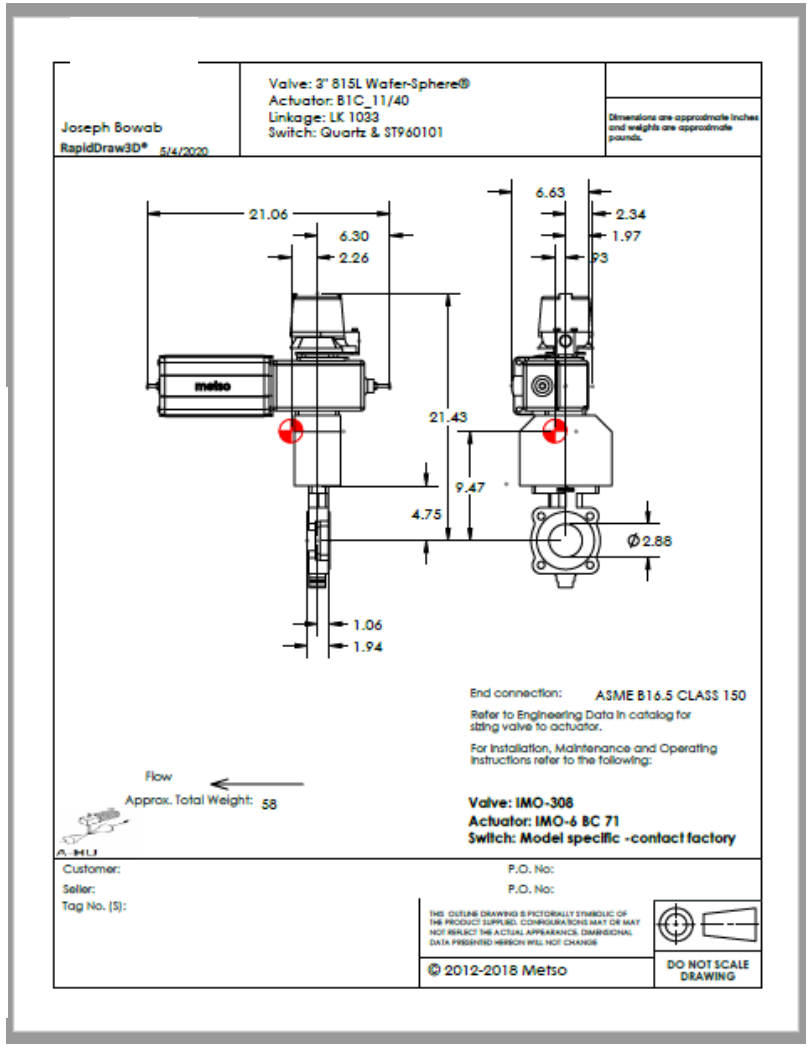
Solution

Nelprof/Linkage Wizard

Designed for easy automation

- Choose valve, actuator & instrumentation
  - Dimensional drawing is generated
  - RapidDraw





Challenge

Ability to automate

Solution

RapidDraw

Applications

NELES

Link for Application Reports

Application reports

Chemicals | Oil & gas general | Paper

Petrochemicals | Power | Pulp

Refining | Minerals processing

Pulp

Batch digesters | Bleaching | Causticizing and lime kiln

Continuous digesters | Evaporation | Washing, screening and other fiberline

Recovery boiler

Recovery boiler

Recovery Boiler

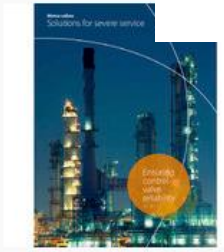
Language options: EN
Code: 2611/09/01 (EN)
Issue: 9/2019

Applications

Link for Brochures relating to applications Commercial Brochures

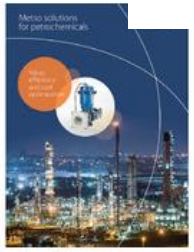
Metso valves Solutions for severe service

Language options: EN
Code: CB063 (EN)
Issue: 4/2017



Metso solutions for petrochemicals

Language options: EN
Code: CB064 (EN)
Issue: 10/2017



Value, efficiency and cost optimization

Language options: EN
Code: CB065 (EN)
Issue: 10/2017

Neles valve solutions for the mining and metals industry

Language options: EN FI RU ES-CL PT-BR
Code: CB066 (EN)
Issue: 7/2020

Challenge

Tools for application specific solutions

Solution

Commercial Brochures

Application Tools

Link for OEM relating to applications

Solutions for:

- Gas Turbines
- Steam Turbines
- Compressor
- Burner Management

Valve solutions for steam turbine manufacturers

Language options: EN
Code: EB002 (EN)
Issue: 10/2017

Challenge

Tools for application specific solutions

Solution

OEM

NELES

Questions?

Applications

NELES

- LW/LG construction according to NACE
- L6 requires 1N construction
- LW/LG/L6
  - Seat A & D for NACE 0103 & 0175
  - Seat K for NACE 0103
- L12 does not comply

Challenge

NACE requirements

Solution

NACE construction

Applications

NELES

- Duplex Stainless Steel standard
  - CF8M can be quoted on customer request
- Type Codes
  - LW__BA_U2U2UKT
  - L1_BA_U2U2KT up to 24”
  - L1_BA_U2U2K1T 26”=>
  - L6_BA_U2U2KT up to 24”
  - L6_BA_USUSK1T 26” =>

Body	ASTM A890 gr.4A
Disc	ASTM A890 gr.4A
Seat	Ultimet (UNS R31233)
Shafts and pins	UNS 31254 (254SMO)
Bearings	INC625+PTFE+PPS(Norglide)
Gland packing	PTFE
Clamp ring bolts	Standard 4A-80

Challenge

Sea water

Solution

Special construction

Applications

NELES

- Z construction
- Soft goods BAM tested -50C to 200C
- Body Material : CF8M
- Disc/Shaft/Pins : CF8M or Monel
- Seat : Incoloy 825 or Ultimate

Z	**OXYGEN CONSTRUCTION** - BAM tested non-metallic materials - T = -50 °C... +200 °C - Max pressure as per body rating - Bearings cobalt based alloy - Oxygen cleaning acc. to Metso internal procedure FC-QC-0001 - Recommended type codes L_ _ _BZ_AACAG or L_ _ _BZ_AMMKG or L_ _ _BZ_MMMKG **Note!** Only Z construction available for oxygen flow media. Not to be used with other flow medias.

Challenge

Oxygen service

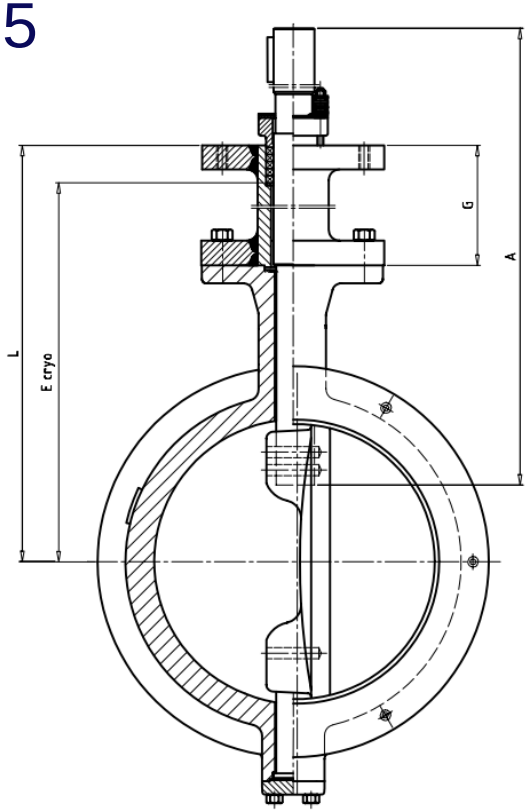
Solution

Z construction

Applications

- C, 1C or 2C construction based on temperature range
- Body Material : CF8M
- Disc/Shaft/Pins : CF8M
- Seat : Incoloy 825

C	**CRYOGENIC (Standard Cryo extension)** - extended bonnet and drive shaft (Cryo extension for T = -200°C to +260°C) - bearings PTFE+ C25 + AISI 316 - body and blind flange gaskets graphite - drive shaft with 1 keyway. (see dimensional dwg. F09881, F09882). - 2 keyways in L6F. E.g. L6CBC__AACAG sizes Link of illustration (dwg F09881 & F09882) for detailed Cryogenic construction and cryo extension dimensions.



Code "1C"

CRYO EXTENSIONS FOR TEMPERATURE RANGE -50 to -100

SIZE	E cryo	L	A	G	Extension pipe ID LWSC	Extension pipe ID LW_L
80	306	332	421	164	716050-0250	917080-0250
100	417	452	562	270	716060-0375	917100-0375
125	440	475	572	270	716060-0375	917100-0375
150	424	459	547	232	716070-0375	916700-0375
200	539	574	672	317	734260-0500	917120-0500
250	578	613	703	323	716080-0500	917140-0500
300	538	573	⚠ 657	253	716090-0500	917160-0500
350	675	718	811	363	716100-0625	917180-0625
400	691	734	824	329	716120-0625	917200-0625

Code "C"

CRYO EXTENSIONS FOR TEMPERATURE RANGE -100 to -200, STANDARD

SIZE	E cryo	L	A	G	Extension pipe ID LWSC	Extension pipe ID LW_L
80	556	582	671	414	716050-0500	917080-0500
100	542	577	687	395	716060-0500	917100-0500
125	565	600	697	395	716060-0500	917100-0500
150	674	709	797	482	716070-0625	916700-0625
200	664	699	783	442	734260-0625	917120-0625
250	703	738	828	446	716080-0625	917140-0625
300	780	823	⚠ 907	503	716090-0750	917160-0750
350	925	968	1061	613	716100-0875	917180-0875
400	941	984	1074	579	716120-0875	917200-0875

Code "2C"

CRYO EXTENSIONS EXTRA HIGH

SIZE	E cryo	L	A	G	Extension pipe ID LWSC	Extension pipe ID LW_L
80	681	707	796	539	716050-0625	917080-0625
100	667	702	812	520	716060-0625	917100-0625
125	690	725	822	520	716060-0625	917100-0625
150	799	⚠ 834	922	607	716070-0750	916700-0750
200	789	⚠ 824	908	567	734260-0750	917120-0750
250	828	863	953	573	716080-0750	917140-0750
300	905	948	⚠ 1032	628	716090-0875	917160-0875
350	1050	1093	1186	736	716100-1000	917180-1000
400	1066	1109	1199	704	716120-1000	917200-1000

NELES

Challenge

Cryogenic service

Solution

C construction

Applications

- Body/Disc - CF8M
  - > 0,04% of carbon (fulfills ASME)
- Shafts - XM-19(N) or Nimonic 80A(H)
- Seats – Ultimet(K) or Nimonic 80A(H)
- Graphite seals and packing
- Stellite bearings
- Bolting:
  - Grade 600 up to 538C(1000F)
  - Grade 660/A4 for higher temperatures
- LW5CBH_AANHG up to 600C(1112F);
  LW5CBH_AAHHG up to 650C(1202F)
- L6CBH_AANHG

H or 1H (NACE)	HIGH CYCLE / HIGH TEMP - shaft bearings surfaces cobalt based alloy - bearings cobalt based alloy - body and blind flange gaskets graphite (ATEX II 2 G c) E.g. L6CBH__AAHHG sizes 04" ...

NELES

Challenge

High temperature service

Solution

H construction

Applications

LW

- Available in Class 300 LW only, 35 Bar(508 PSI) max dp
- Body Material : CF8M; Disc : CF8M/ F316+ cobalt based alloy on disc edge
- Shaft/Pins : AISI 316 + METCO 19E
- Seat : Incoloy 825
- LW5DBT_ABA1AG-F14 type code example for NA

T	**HIGH CYCLING (only for LW5 / LW8)** - metal bearings, hard facing disc, fully balanced construction (packing on both shafts), bracket included to valve construction, - use AISI316 shaft with Metco 19E bearing surface (code "A1") as preferred - Maximum pressure difference (dp) 35 bar. " Restrictions with JIS flanges. Suitability to be checked from engineering." Meant for HIGH PRESSURE + HIGH CYCLE in moderate pressures use the LW_BH... Type code example: LW8MBT200ABA1AG–F14 or LW8MBT200AB1A1AG–F14 (F14 = actuator mounting face size) Bare shaft valve **(ATEX II 2 G c)** **Note:** for detailed High Cycling construction see LINK of drawing F12366.

NELES

Challenge

High cycle service

Solution

T construction

Applications

L6

- H or 1H(NACE) construction
- Body/Disc material : CF8M
- Disc : CF8M/ F316+ cobalt based alloy on disc edge
- Shaft/Pins/Seat : Nimonic 80A, 64” Max internals
- Same code as high temp service

H or 1H (NACE)	HIGH CYCLE / HIGH TEMP - shaft bearings surfaces cobalt based alloy - bearings cobalt based alloy - body and blind flange gaskets graphite (ATEX II 2 G c) E.g. L6CBH__AAHHG sizes 04" ...

NELES

Challenge

High cycle service

Solution

High cycle construction

Applications

- Eliminates cavitation
- Reduces noise
- Balances turbulence
- Available for LW/LG/L6

1. sign	S-DISC CONSTRUCTION
S-	Flow balancing trim on downstream side of body flow port Only for LW7-/LG7-series, LW8-/ LG8-series and LG2-series

1	2	3	4	5	6	7	8	9	10	11	12
S-	LG	5	C	B	A	04	A	A	C	A	T

NELES

Challenge

High noise/vibration

Cavitation

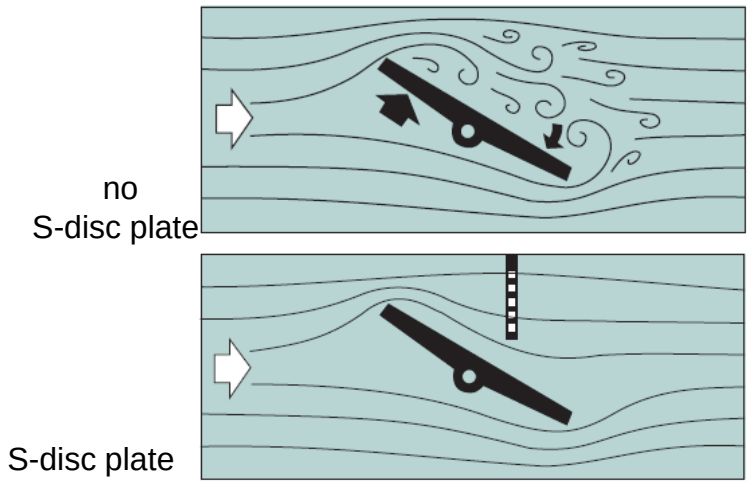
Dynamic instability

Solution

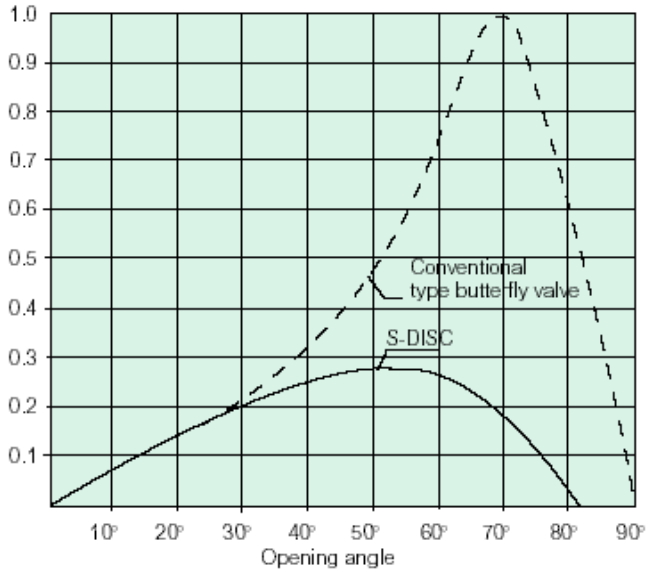
Flow balancing trim

Applications

- The recommended position of the plate is at the top of the pipeline on the downstream side.



Torque requirements
of conventional and *S-Disc*
equipped butterfly valve.



Challenge

High noise/vibration

Cavitation

Dynamic instability

Solution

Flow balancing trim

Applications

- ASME 600 Class body w/ reduced trim
- L6F/D tightness level same as L6D
  - ISO 5208 Rate A w/ K seat – low pressure air
  - ISO Rate B to preferred flow direction only – high pressure water
- Max DP
  - 52 Bar(750 psi) max in preferred direction
  - 40 bar(580 psi) max in non-preferred direction

NELES

Challenge

ASME 600 CLASS

Zero leakage

Bi-directional

Solution

L6F/D

Applications

- ASME 600 Class Body w/ reduced trim
- L6F/E tightness level
  - ISO 5208 Rate B – low pressure air
  - ISO Rate B to preferred flow direction only – high pressure water
- Max dp varies with disc materials
  - CF8M disc up to 57bar(827 psi) @rt in preferred direction
  - CA6NM & WC6 up to 65bar(943 psi) @rt in preferred direction
  - 40 bar(580 psi) max in non-preferred direction

NELES

Challenge

ASME 600 CLASS

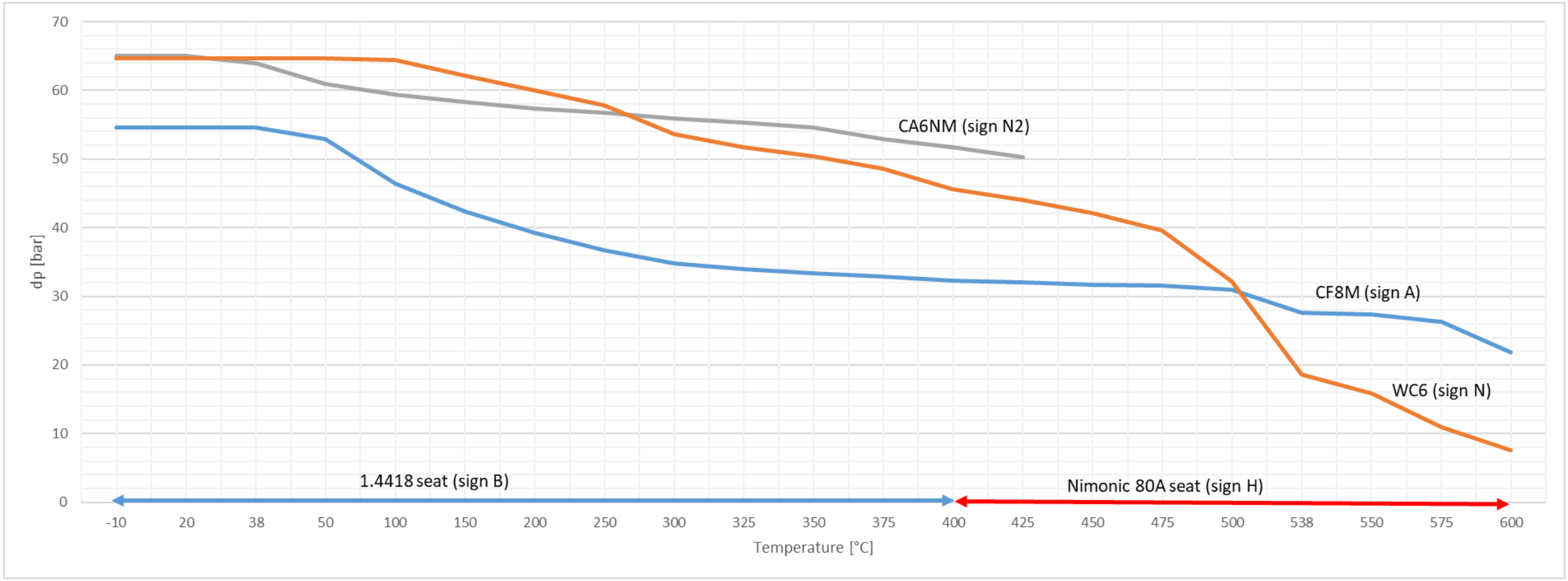
Zero leakage

Bi-directional

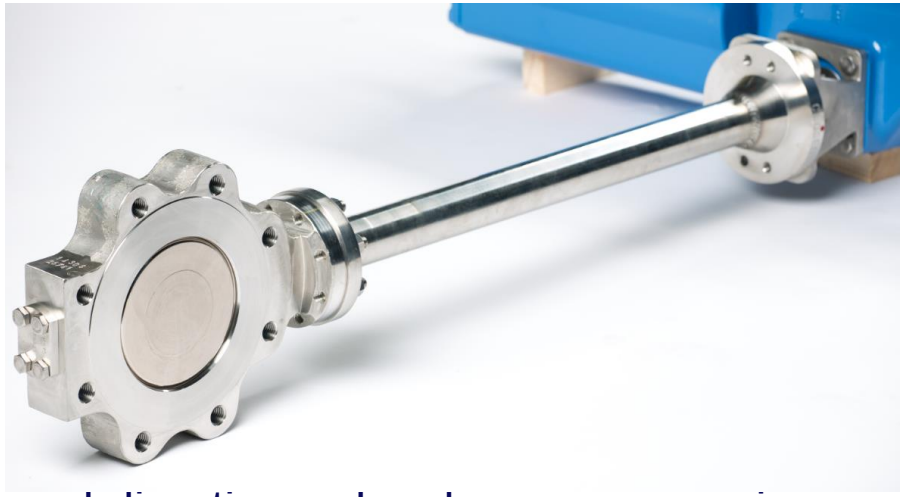
Solution

L6F/E

Applications



Applications



- Fully rated ASME 600 Class
- Double offset
- BWX tightness level
  - ISO 5208 Rate C(Class V) in preferred direction only – low pressure air
    - Class IV in non-preferred direction only
  - ISO 5208 Rate C(Class V) in preferred direction only– high pressure water
    - No testing to non-preferred side
- Max opening dp varies with size
  - 4”-24” 80 Bar(1160 psi) max in preferred direction(BWX)
  - 28”-60” 50 Bar(725 psi) max in preferred direction(BWL)
  - Closing & holding are rated to full pressure

NELES

Challenge

ASME 600 CLASS

Zero leakage

Bi-directional

Solution

BWX/BWL

Product Offering

NELES

*16”-24” Overlap of LW/LG & L1/L2 – Cv difference of 60% for ASME 300

	LW/LG		L6	L12	L1/L2	
Body Style	Wafer	Lugged	Double Flanged	Wafer	Wafer	Lugged
Size Range	3” – 24”	3” – 24”	4” – 88”	3” – 56”	16” – 48”	16” – 36”
Pressure	ASME Class 150/300 28”-36” F-T-F ISO 5752 series 16 & ASME 150 Series B Drilling		4”-56” ASME Class 150/300 3”-36” ASME 600 w/ 300 trim 62”-88” 10 Bar Max Class 150 62”-88” 50 Bar Max Class 300	3”-5” 25 Bar Max 6” 20 Bar Max 8”-40” 10 Bar Max 48”-56” 6 Bar Max	16”-48” ASME Class 150 16”-36” ASME Class 300	18”-36” ASME Class 150 16”-30” ASME Class 300
Temperature	-329°F to +1110°F		-329°F to +1110°F	-60°F to 500°F	-329°F to +1110°F	
Face to Face	API 609 class 150/300 category B LW2/LG2 matches L1/L2*		API 609 category B valves Double-flanged (short pattern)	ISO 5752 Series 20	L1C per ISO 5752 Series 25 L1D per Metso	L2C per ISO 5752 Series 16 L2D per Metso
Body Material	Standard: CS, 316 SS Optional: Common/alloyed steels, 317 SS, Alloy 20, Monel, Hastelloy C			Body/Disc: 316 SS Shaft: SIS 2324, 17-4PH+hard facing	Standard: CS, 316 SS Optional: Common/alloyed steels, 317 SS, Alloy 20, Monel, Hastelloy C	
Seating	Metal(A, H, K)		Metal(A, B, H, H1, K, K1, D)	Metal(A, B)	Metal(A, B, H, K)	
Actuation	B1/QPX/VPVL/Gears				B1/QPX/VPVL/Gears	

Product Offering

NELES

	BWX	BWL
Body Style	Wafer, Lugged, Double Flanged	
Size Range	3” – 24”	28” – 60”
Pressure	ASME Class 600 BTO 80 Bar (1160 PSI) Max	ASME Class 600 BTO 50 Bar (725 PSI) Max
Temperature	-329°F to +1110°F	
Face to Face	API 609 class category B API 609 category B valves Double-flanged (short pattern)	ASME B 16.47 Series B
Body Material	Standard: CS, 316 SS Optional: Common/alloyed steels, 317 SS, Alloy 20, Monel, Hastelloy C	
Seating	Metal(U seat, step seat, no seat)	
Actuation	B1/QPX/VPVL	

Butterfly Valves Certification/Approvals

NELES

	LW/LG	L1/L2	L6	L12	BWX
CRN	Yes	Yes	Yes	Yes	No
API 607	6th Edition, 4”-24” ASME 150/300 All Constructions, CS/SS, Graphite Packing 7th Edition, 4”-24” ASME 150/300 X Constructions, CS/SS, ISO Graphite Packing	6th Edition, 16”-48” ASME 150/300 All Constructions, CS/SS, Graphite Packing	6th Edition, 4”-88” ASME 150/300 All Constructions, CS/SS, Graphite Packing 7th Edition, 4”-88” ASME 150/300 X Constructions, CS/SS, ISO Graphite Packing	No	No
SIL	SIL 3	SIL 3	SIL 3	SIL 3	SIL 3
NACE 0103 & 0175	Yes	Yes	1N Construction	No	Application Sign “N” for 0103 Special request for 0175

Butterfly Valves Certification/Approvals – ISO 15848

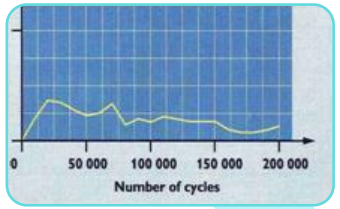
NELES

	LW/LG(X-constr.) 150 CLASS	LW/LG(X-constr.) 300 CLASS	L6C(X-constr.)	L6D(X-constr.)	BWX
CLASS AH	4”-24” CO-3, -29C to 40C	4”-20” CO-3, -29C to 40C	5”-30” CO-3, -29C to 40C	5”-20” CO-3, -29C to 40C	6”-28” CO-1, -29C to 40C
CLASS AH					3”-18” CC-1, 5C to 200C Stem extension
CLASS AH					12”-56” CO-1, -5C to 40C
CLASS AH					6”-36” CC-1, -49C to 40C Stem extension
CLASS BH			4”-30 CC-2, -29C to 400C	4”-20” CC-2, -29C to 400C	6”-36” CC-1, 5C to 215C Stem extension
CLASS BH			4”-30” CO-3, -29C to 400C	4”-20” CC-2, -29C to 400C	
CLASS BH			18”-88” CO-1, -29C to 400C	12”-48” CO-1, -29C to 400C	
CLASS CH	8”-32” CO-1, -196C to 40C	6”-24” CO-1, -196C to 40C	10”-32” CO-1, -196C to 40C	8”-24” CO-1, -196C to 40C	
TA LUFT	3”-24” VDI 2440 200,000 >250C LW ONLY				

Overview Summary

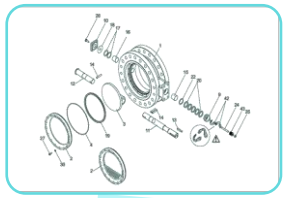
NELES

Long lasting tightness



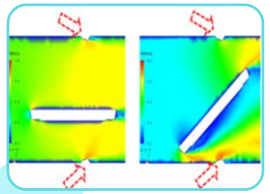
Reduced cost

Simplicity of maintenance



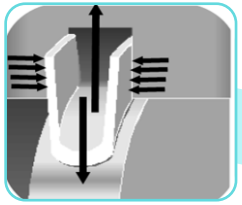
Reduced cost

Protected seat



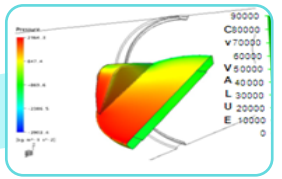
Reduced cost

Stable performance



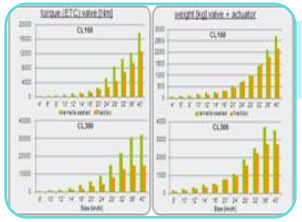
Reduced cost

High flow capacity



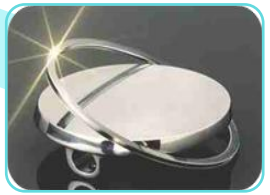
Reduced cost

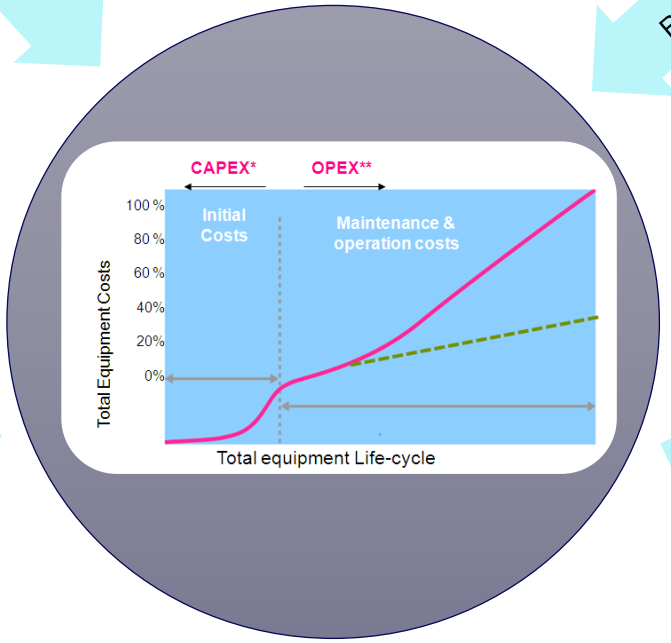
Low torque, less weight



Reduced cost

Robust design





Reduced total cost of ownership

Widest Capacity Range

Contact us

- Product Manager – Joseph Bowab
  - joseph.bowab@neles.com
  - 1-508-340-8022
- Applications Engineering
  - apps.engineering@neles.com
- Area Sales Managers map
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