## CLAIMS

1. An injector cleaning apparatus comprising a concentric dual flow introducer and a flow-dispersing injector seat, wherein:

the concentric dual flow introducer comprises an inner concentric cleaning fluid flowpath configured to communicate with a central passage of a gas injector, an outer concentric cleaning fluid flowpath configured to communicate with a plurality of peripheral passages of the gas injector, and

an input-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the input-side injector engaging interface having compressibility sufficient to yield under cleaning fluid surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of the gas injector and the rigid facing portion of the input-side injector engaging interface and maintain an input-side injector floating gap between the gas injector and the rigid facing portion of the input-side injector engaging interface, wherein the concentric dual flow introducer interfaces with a first end of the gas injector at the input-side injector engaging interface; and

the flow-dispersing injector seat comprises

an output-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the output-side injector engaging interface having compressibility sufficient to yield under cleaning fluid surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of the gas injector and the rigid facing portion of the output-side injector engaging interface and maintain an output-side injector floating gap between the gas injector and the rigid facing portion of the output- side injector engaging interface, the flow-dispersing injector seat interfacing with a second end of the gas injector.

2. The injector cleaning apparatus of claim 1, wherein the injector cleaning apparatus further comprises an inner flow control module to regulate flow of deionized water and compressed dry air to the inner concentric cleaning fluid flowpath and an outer flow control module to regulate flow of deionized water and compressed dry air to the outer concentric cleaning fluid flowpath.

3. The injector cleaning apparatus of claim 2 wherein the inner flow control module, the outer flow control module, or both comprise at least one valve, at least one pressure regulator, and at least one flow regulator.

4. The injector cleaning apparatus of claim 1 wherein the compressible sealing portion of the input-side injector engaging interface; the compressible sealing portion of the output-side injector engaging interface or both the compressible sealing portion of the input-side injector engaging interface and the compressible sealing portion of the output-side injector engaging interface comprise 0-ring type seals.

5. The injector cleaning apparatus of claim 4 wherein both the compressible sealing portion of the input-side injector engaging interface and the compressible sealing portion of the output-side injector engaging interface comprise O-ring type seals.

6. The injector cleaning apparatus of claim 1 wherein the compressible sealing portion of the input-side injector engaging interface is disposed in a recessed channel formed in the concentric dual flow introducer and the compressible sealing portion of the output-side injector engaging interface is disposed in a recessed channel formed in the flow-dispersing injector seat.

7. The injector cleaning apparatus of claim 1 wherein the injector cleaning apparatus further comprises a discharge chamber to collect and drain fluid discharge from the flow-dispersing injector seat.

8. The injector cleaning apparatus of claim 1 wherein the injector cleaning apparatus further comprises a spacer ring disposed between the flow-dispersing injector seat and the concentric dual flow introducer.

9. The injector cleaning apparatus of claim 1 wherein the flow-dispersing injector seat further comprises an inner base ring and an outer base ring.

10. The injector cleaning apparatus of claim 1 wherein all wetted surfaces are not comprised of stainless steel.

11. The injector cleaning apparatus of claim 1 wherein the flow-dispersing injector seat and concentric dual flow introducer are comprised of polypropylene.

12. An injector cleaning apparatus comprising a concentric dual flow introducer, a flow-dispersing injector seat, an inner flow control module, and an outer flow control module, wherein:

the concentric dual flow introducer comprises an inner concentric cleaning fluid flowpath configured to communicate with a central passage of a gas injector, an outer concentric cleaning fluid flowpath configured to communicate with a plurality of peripheral passages of the gas injector, and

an input-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the input-side injector engaging interface having compressibility sufficient to yield under cleaning fluid surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of the gas injector and the rigid facing portion of the input-side injector engaging interface and maintain an input-side injector floating gap between the gas injector and the rigid facing portion of the input-side injector engaging interface, wherein the concentric dual flow introducer interfaces with a first end of the gas injector at the input-side injector engaging interface; and

the flow-dispersing injector seat comprises an output-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the

compressible sealing portion of the output-side injector engaging interface having compressibility sufficient to yield under cleaning fluid surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of the gas injector and the rigid facing portion of the output-side injector engaging interface and maintain an output-side injector floating gap between the gas injector and the rigid facing portion of the output-side injector engaging interface and the flow-dispersing injector seat further comprises an inner base ring and an outer base ring, the flow-dispersing injector seat interfacing with a second end of the gas injector at the output-side injector engaging interface;

the inner flow control module is configured to regulate flow of deionized water and compressed dry air to the inner concentric cleaning fluid flowpath; and

the outer flow control module is configured to regulate flow of deionized water and compressed dry air to the outer concentric cleaning fluid flowpath.

# CLAIMS

1. An injector cleaning apparatus comprising a concentric dual flow introducer and a flow-dispersing injector seat, wherein:

the concentric dual flow introducer comprises

an inner concentric cleaning fluid flowpath configured to communicate with a central passage of a gas injector,

an outer concentric cleaning fluid flowpath configured to communicate with a plurality of peripheral passages of a gas injector, and

an input-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the input-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the input-side injector engaging interface and maintain an input-side injector floating gap between an injector and the rigid facing portion of the input-side injector engaging interface; and

the flow-dispersing injector seat comprises

an output-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the output-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the output-side injector engaging interface and maintain an output-side injector floating gap between an injector and the rigid facing portion of the output-side injector engaging interface.

2. The injector cleaning apparatus of claim 1 wherein the injector cleaning apparatus further comprises an inner flow control module to regulate flow of deionized water and compressed dry air to the inner concentric cleaning fluid flowpath and an outer flow control module to regulate flow of deionized water and compressed dry air to the outer concentric cleaning fluid flowpath.

3. The injector cleaning apparatus of claim 2 wherein the inner flow control module, the outer flow control module, or both comprise at least one valve, at least one pressure regulator, and at least one flow regulator.

4. The injector cleaning apparatus of claim 1 wherein the compressible sealing portion of the input-side injector engaging interface; the compressible sealing portion of the output-side injector engaging interface or both the compressible sealing portion of the input-side injector engaging interface and the compressible sealing portion of the output-side injector engaging interface comprise O-ring type seals.

5. The injector cleaning apparatus of claim 4 wherein both the compressible sealing portion of the input-side injector engaging interface and the compressible sealing portion of the output-side injector engaging interface comprise O-ring type seals.

6. The injector cleaning apparatus of claim 1 wherein the compressible sealing portion of the input-side injector engaging interface is disposed in a recessed channel formed in the concentric dual flow introducer and the compressible sealing portion of the output-side injector engaging interface is disposed in a recessed channel formed in the flow-dispersing injector seat.

7. The injector cleaning apparatus of claim 1 wherein the injector cleaning apparatus further comprises a discharge chamber to collect and drain fluid discharge from the flow-dispersing injector seat.

8. The injector cleaning apparatus of claim 1 wherein the injector cleaning apparatus further comprises a spacer ring disposed between the flow-dispersing injector seat and the concentric dual flow introducer.

9. The injector cleaning apparatus of claim 1 wherein the flow-dispersing injector seat further comprises an inner base ring and an outer base ring.

10. The injector cleaning apparatus of claim 1 wherein all wetted surfaces are not comprised of stainless steel.

11. The injector cleaning apparatus of claim 1 wherein the flow-dispersing injector seat and concentric dual flow introducer are comprised of polypropylene.

12. An injector cleaning apparatus comprising a concentric dual flow introducer, a flow-dispersing injector seat, an inner flow control module, and an outer flow control module, wherein:

the concentric dual flow introducer comprises

an inner concentric cleaning fluid flowpath configured to communicate with a central passage of a gas injector,

an outer concentric cleaning fluid flowpath configured to communicate with a plurality of peripheral passages of a gas injector, and

an input-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the input-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the input-side injector engaging interface and maintain an input-side injector floating gap between an

injector and the rigid facing portion of the input-side injector engaging interface;

the flow-dispersing injector seat comprises

an output-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the output-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the output-side injector engaging interface and maintain an output-side injector floating gap between an injector and the rigid facing portion of the output-side injector engaging interface and the flow-dispersing injector seat further comprises an inner base ring and an outer base ring.

the inner flow control module is configured to regulate flow of deionized water and compressed dry air to the inner concentric cleaning fluid flowpath; and

the outer flow control module is configured to regulate flow of deionized water and compressed dry air to the outer concentric cleaning fluid flowpath.

13. A method of cleaning a gas injector, the method comprising:

providing an injector cleaning apparatus comprising a concentric dual flow introducer, a flow-dispersing injector seat, an inner control module, and an outer control module, wherein:

the concentric dual flow introducer comprises;

an inner concentric cleaning fluid flowpath configured to communicate with a central passage of a gas injector;

an outer concentric cleaning fluid flowpath configured to communicate with a plurality of peripheral passages of a gas injector;

and an input-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing

portion of the input-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the input-side injector engaging interface and maintain an input-side injector floating gap between an injector and the rigid facing portion of the input-side injector engaging interface;

the flow-dispersing injector seat comprises;

an output-side injector engaging interface comprising a compressible sealing portion and a rigid facing portion, the compressible sealing portion of the output-side injector engaging interface having compressibility sufficient to yield under fluid cleaning surges attributable to initiation and termination of cleaning fluid flow through the injector cleaning apparatus and resiliency sufficient to prevent abutment of a gas injector and the rigid facing portion of the output-side injector engaging interface and maintain an output-side injector floating gap between an injector and the flow-dispersing injector seat;

the inner flow control module regulates flow of deionized water and compressed dry air to the inner concentric cleaning fluid flowpath; and

the outer flow control module regulates flow of deionized water and compressed dry air to the outer concentric cleaning fluid flowpath;

introducing deionized water and compressed dry air into the inner concentric cleaning fluid flowpath; and

introducing deionized water and compressed dry air into the outer concentric cleaning fluid flowpath.

14. The method of cleaning a gas injector of claim 13 wherein the inner flow control module regulates flow of deionized water into the inner concentric cleaning fluid flowpath at

approximately 3.5 to approximately 4.0 gallons per minute and compressed dry air at a pressure between approximately 40 and approximately 45 psi.

15. The method of cleaning a gas injector of claim 13 wherein the outer flow control module regulates flow of deionized water into the outer concentric cleaning fluid flowpath at approximately 3.5 to approximately 4.0 gallons per minute and compressed dry air at a pressure between approximately 40 and approximately 45 psi.