



AKKIYA INDUSTRIES LLC

**ATMOSPHERE
CONTROLLED FURNACES**

MANUFACTURERS OF

ENERGYSAVING HEATTREATMENT FURNACES, OVENS

AND ITS ACCESSORIES AS PER CQI NORMS, NADCAP AND AMS2750 STANDARDS

AUTOMATIC OPERATION OF INTEGRAL SEALED QUENCH FURNACE

Achieved by

- PLC- SCADA Operation
- Time Temperature Programmer
- CP control by Oxygen Probe
- Temperature control for furnace and quench tank
- Interlocks
- Built in safety features
- Alarms (audio/Visual) for abnormal operations

Superior Features

- Carrier gas in furnace chamber maintains basic carbon potential through out the cycle, preventing decarburization, surface oxidation and maintains positive pressure in the furnace (no air ingress)
- Quenching under atmosphere - Transfer of charge as per programmed cycle, quenching done in 15 seconds
- Direct lowering of charge (dunk quenching) with guided flow of oil, agitation and heat exchanger operation ensures consistent results with uniform hardness & case

CONTINUOUS MONITORING AND CONTROL

- Temperature furnace / quench oil
- Carbon potential – boost / diffuse/ hardening
- Rate of heating
- Rate of cooling
- Quench tank oil agitation
- Heat exchanger operation
- Flow of atmosphere
- Recording of furnace operating parameters

DATA LOGGING AND ACQUISITION SYSTEM/MMI

Input From:	Temperature controller 4 – 20 ma output CP controllers 4 – 20 ma output PLC (in built timers) Limit switches
Through Display on PC:	SCADA software and RS 438 communication port Real time/temperature profile CP values Set values/ Actual values utility failures Graphical/Digital display

ENVIRONMENTAL / EMISSION NORMS - COMPLIES WITH NORMS

- Effluents fully burned to emit only CO₂, NH₃
- SO_x value less than 100 ppm
- NO_x value less than 100 ppm
- Noise less than 80db

FURNACE CONFORMANCE – UNDER API- 6A NORMS & COL-9 NORMS

- 9 point thermal mapping
- Sample test for ECD & hardness (subject to standard tolerance ECD variation – 0.2 mm for 1.2 hardness within 3 HRC as quenched)

MAINTENANCE

- All moving parts easily accessible
- No moving parts in heat chamber
- Replacement of heaters from the top even at a furnace temperature of 250 – 300
- Auto de-sooting for oxygen probe

MULTI PROCESS CAPABILITY OF SEALED QUENCH FURNACE

- Case hardening – Carburizing
- Case hardening – Carbonitriding
- Through hardening – without decarburizing
- Normalizing / Annealing – without decarburizing
- Austentic Nitro-Carburizing

PROTECTIVE ATMOSPHERE FOR SEALED QUENCH FURNACE

- Nitrogen – Hardening
- Nitrogen methanol – Carburizing
- Endothermic gas – Carburizing
- LPG + air – Direct Carburizing
- Ammonia + nitrogen + methanol – Carbonitriding

SAFETY FEATURES- INBUILT

- Initial purging with endo gas only at temperature above 760° C
- In case of sustained power failure & temperature falls below 760° C , automatic N2 purging.
- Air cooled heat exchanger for quench oil instead of water to prevent water entering oil and eliminate explosion.
- Roller platform in elevator instead of chain to avoid brittleness of chain
- Backup safety for temperature controllers furnace heating and quench oil heating
- Furnace pressure switch provided to maintain positive pressure inside the furnace
- quench oil temperature – abnormal increase – CO₂ flushing to prevent oil fire
- Flame failure monitor for pilot burner – audio visual alarm
- Quench oil level low / high – audio visual alarm
- Interlock with flame curtain for rear door opening
- Torque limiter in pusher motor drive to prevent furnace over loading

- Manual reset without rectifying failure mode not possible
- Essential interlocks cannot be operated on manual mode
- All utility failure – pressure sensed – audio / visual alarm
- Over temperature alarm fan bearing water cooling system
- Endo / LPG cut off incase of power failure – beyond 15 minutes
- Quenching under atmosphere
- Fully supported by elevator platform – no hanging
- Oxygen probe not exposed to air, no thermal shock, no oxidation (zirconia)
- Heating element fully protected from carburizing atmosphere by outer sheeting
- Integral cast fan – i.e. fan shaft and impeller in one piece – avoiding bolting of impeller – main source of fan failure

SPECIAL FEATURES IN INTEGRAL QUENCH FURNACE LINE

PREHEATING FURNACE

Fan RPM monitoring
Furnace Temperature High / low Digital Ammeter
Process timer
Heater failure monitor

POST WASHING MACHINE

Temperature High / Low Process timer
Alkali water temperature low / High Hot water temperature low / High Air dryer temperature
Low / High Process timer
Alkali Water level low /high alarm
Heater failure monitor for alkali water heater Heater failure monitor for hot water heater Heater failure
monitor for air dryer heater Digital Ammeter

INTEGRAL SEALED QUECNH FURNACE

Heater failure monitor Fan RPM Monitor
Agitator 1 and Agitator 2 fan RPM motor monitor
Quench delay timer logic in PLC and displayed on SCADA Furnace temperature high / low alarm
Quenching oil temperature high / low alarm Furnace CP % low / high
Digital Ammeter

MULTI CHAMBER SEALED QUEENCH FURNACE (CGC)

- Preheating, Tempering, Combustion chamber fans RPM monitor
- Agitators RPM monitor
- Heating zone, Boost Zone & Hardening zone temperature low / high alarm display on SCADA
- Boost zone & Hardening zone CP % low / high alarm display on SCADA
- Quenching oil temperature low/high alarm display on SCADA
- Preheating zone temperature low/high alarm display on SCADA
- Tempering Furnace temperature low/high alarm display on SCADA
- Digital ammeter for preheating heater, Tempering heater, alkali water heater, hot water heater and quenching oil heater
- Heater failure monitor for Preheating heater, tempering heater and quench oil heater
- Quench delay timer logic in PLC and displayed on SCADA
- Alkali water low / high level

TEMPERING FURNACE

- Fan RPM monitoring
- Furnace Temperature High / low Digital Ammeter
- Process timer
- Heater failure monitor

HIGH TEMPERING FURNACE

- Fan RPM monitoring
- Furnace Temperature High / low Digital Ammeter
- Process timer
- Heater failure monitor

MULTI CHAMBER INTEGRAL QUENCH FURNACE, WASHING AND TEMPERING FURNACE



2750 KGS CAPACITY INTEGRAL SEALED QUENCH FURNACE



WASHING, PREHEATING AND TEMPERING FURNACE



INTEGRAL SEALED SALT QUENCH FURNACE



INTEGRAL SEALED QUENCH FURNACE

