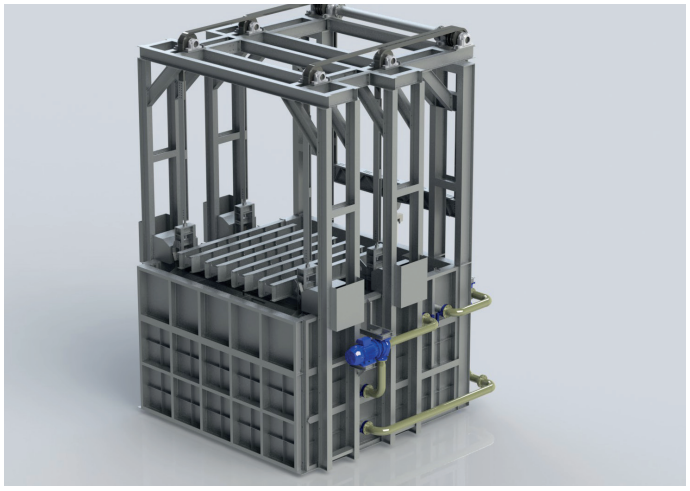
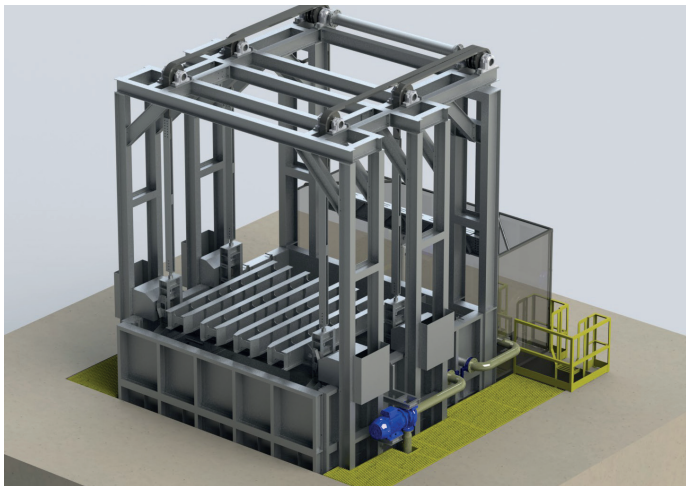
Quench Systems

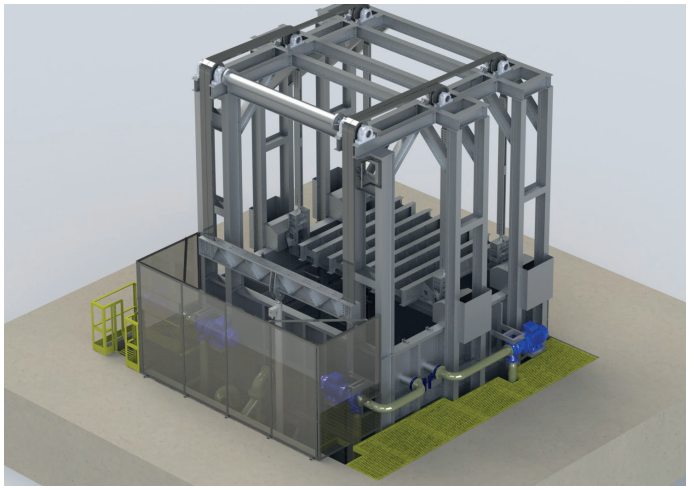
BESPOKE FURNACE MANUFACTURERS

MADE IN BRITAIN

Tanks – Chillers - Agitation





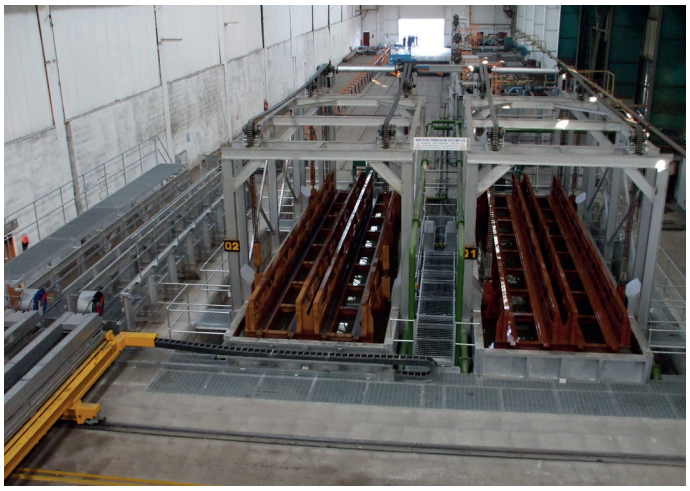


Quenching Systems

Northern Combustion Systems has a wealth of experience and knowledge in the design, manufacture and install of quenching systems. Optimal quench uniformity is essential if the potential for cracking, distortion, residual stress and spotty hardness is to be minimized. Cooling must be as uniform as possible throughout the quenching process.

Agitation is one of the most critical areas of system design. The quenching performance of a liquid quenchant can be controlled by controlling the agitation in the quench tank. Without agitation, a vapor layer or bubbles form at the hot part surface and the natural convention of the quenchant limit the heat extraction rate at the quenched part surface. Resistance to the heat extraction rate can be reduced by breaking the vapor layer or by inducing a turbulent convection at the part surface through agitation (i.e. forced circulation of the quenchant). This is achieved by placing a network of piping within the tank, on the walls and floor with jet nozzles directed at the parts surface.

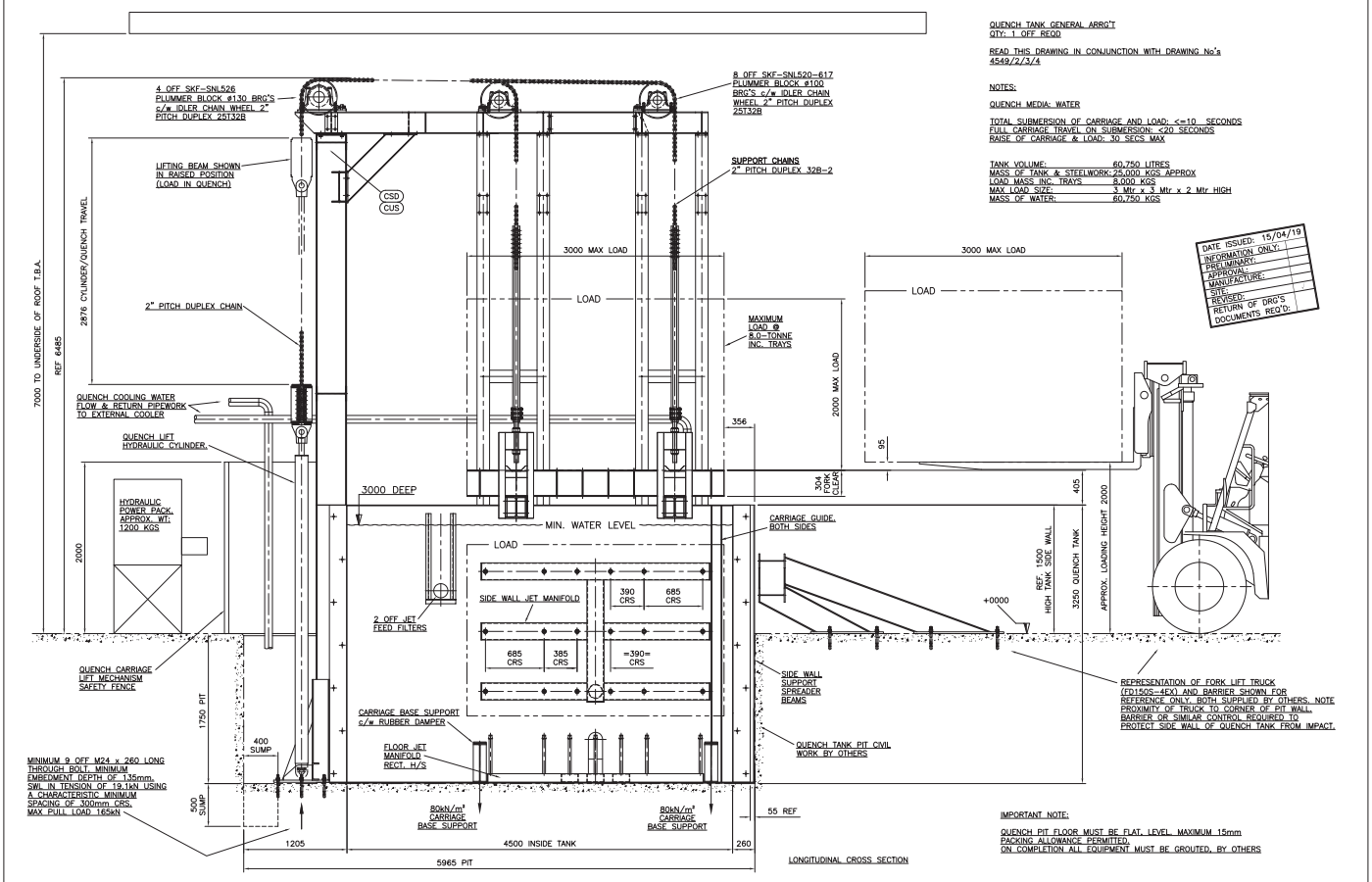
Water Quench Specification	
Capacity:	20 tonnes at up to 4.5 metres in length
Tank size:	5.5. (L) x 4.5m (W) x 4.7m (D)
Water Capacity:	116,000 Litres
Hydraulic lifting mechanism	
Multi-jet high velocity pumped agitation with re-circulation	



External to the tanks are several pumps of various sizes specified on the size and volume of the tank and the agitation required. This could range from 1 x 22kw pump on our smaller tanks, and 4 x 55kw pumps on our larger tanks. All our pumps are controlled by variable frequency drives (VFD) to control the amount of agitation within the tank.

Another critical area of the design is water temperature. It is crucial to keep the quenchant temperature as low as possible after the part has been submerged, this is a key factor when calculating the tanks volume and is based on the temperature and mass of the part to be quenched and the frequency of quenches.
If the system is going to be used frequently and rapid cooling of the quenchant is required, then a cooling system will be added. Quenchant temperature will be monitored by temperature sensors, when the temperature raise's above a pre-defined setpoint, quenchant will be drawn from the top of the tank and pumped through a cooling system and returned to the bottom of the tank. Various types of cooling systems, including Adiabatic coolers, Tower coolers and closed loop heat exchangers will be used depending on the rate at which cooling is required and the tank volume.

Water / Polymer Quench Specification:	
Capacity:	20 tonnes at up to 12.6 metres in length
Tank size:	12.8m (L) x 3.5m (W) x 4.3m (D)
Water / Polymer capacity:	180,000 litres
Hydraulic lifting mechanism	
Multi-jet high velocity pumped agitation with re-circulation	



QUENCH TANK GENERAL ARRG'T
QTY: 1 OFF REQD

READ THIS DRAWING IN CONJUNCTION WITH DRAWING No's 4549/2/3/4

NOTES:

QUENCH MEDIA: WATER

TOTAL SUBMERSION OF CARRIAGE AND LOAD: <=10 SECONDS
FULL CARRIAGE TRAVEL ON SUBMERSION: <20 SECONDS
RAISE OF CARRIAGE & LOAD: 30 SECS MAX

TANK VOLUME: 60,750 LITRES
MASS OF TANK & STEELWORK: 25,000 KGS APPROX
LOAD MASS INC. TRAYS 8,000 KGS
MAX LOAD SIZE: 3 Mtr x 3 Mtr x 2 Mtr HIGH
MASS OF WATER: 60,750 KGS

DATE ISSUED: 15/04/19
INFORMATION ONLY:
PRELIMINARY:
APPROVAL:
MANUFACTURE:
SITE:
REVISED:
RETURN OF DRG'S
DOCUMENTS REQ'D:

IMPORTANT NOTE:

QUENCH PIT FLOOR MUST BE FLAT, LEVEL, MAXIMUM 15mm PACKING ALLOWANCE PERMITTED, ON COMPLETION ALL EQUIPMENT MUST BE GROUTED, BY OTHERS

TOLERANCING: Unless otherwise stated the following tolerances are to apply.
FABRICATION: Overall dimensions ± 5.00mm; Hole features ± 0.10mm; Machining ± 0.125mm
SQUARENESS: Diagonal dimensions must not vary by more than ± 5.00mm.
FLATNESS: Boxing or hogging must not exceed ± 5mm.

BRICKWORK: Unless otherwise stated brickwork should be laid smoothly with flat surface bed within ± 5mm. Maximum permissible step between each ± 2.00mm bricks or tiles. Overall dimensions should be within ± 5.00mm

WELDING: All joints and connections of RE. Sections to be continuously welded. Plate sections to be intermittent 75mm welded at 150mm pitch. unless otherwise stated.

DIMENSIONS IN MM.

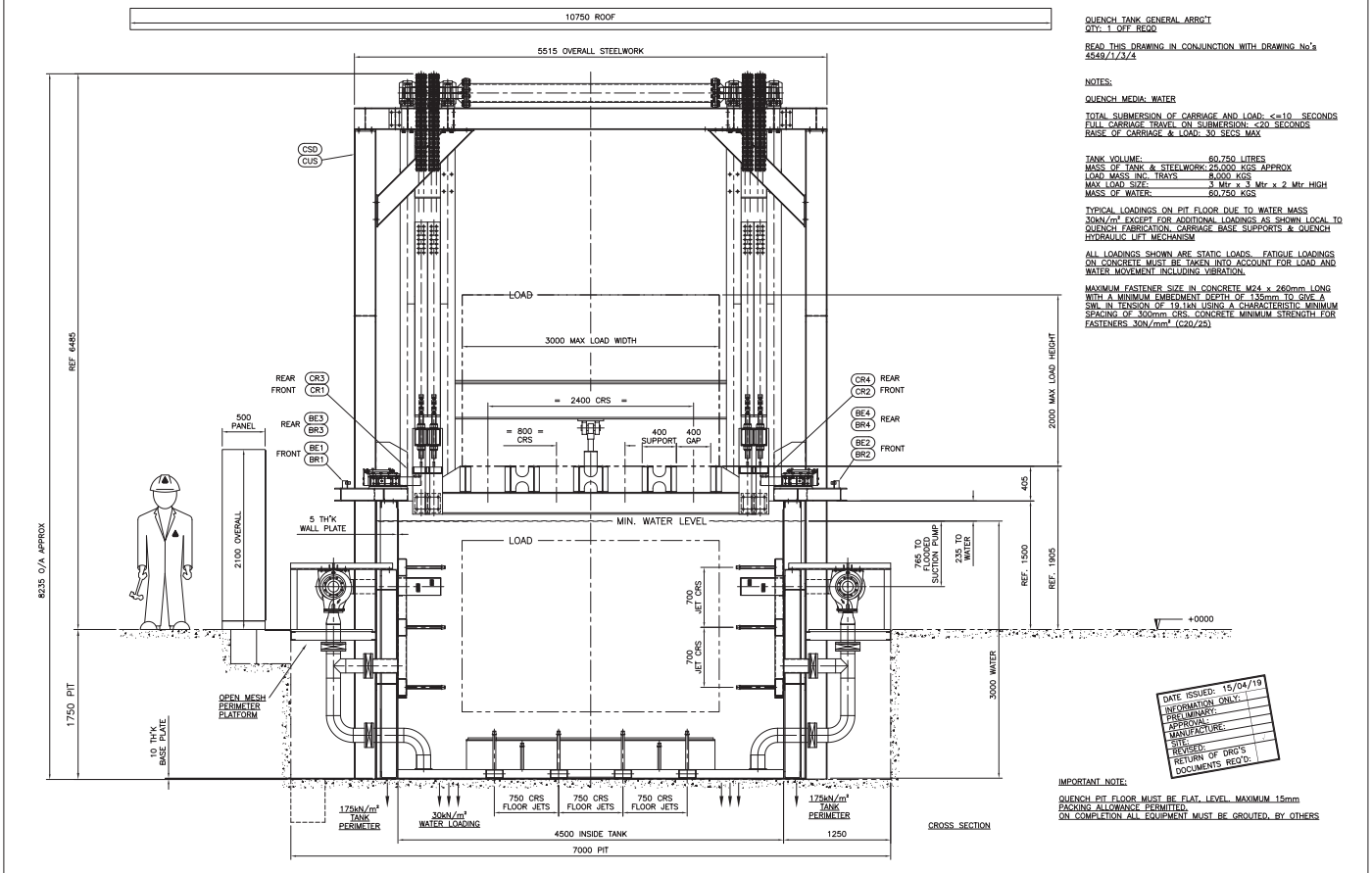
REV	NAME	DATE	DESCRIPTION
F			
E			
D			
C			
B	C.H	15.04.19	INCLUDES REFERENCES TO LIMIT / PROXIMITY SWITCHES CSD, CUS
A	C.H	12.03.19	FOR APPROVAL.

	NAME	DATE
DRAWN	M HANSON	11/02/19
CHECKED		
APPROVED		
SCALE	1:20 @ A1	

NORTHERN COMBUSTION SYSTEMS LTD.
TITLE: GENERAL ARRANGEMENT LONGITUDINAL CROSS SECTION QUENCH TANK

DO NOT SCALE IF IN DOUBT ASK ADDRESS: PEPPERODY WORKS, 64,BATTYE STREET, DEWSBURY. WEST YORKSHIRE. ENGLAND. WF13 1NX. TELE: +44 (0) 1924 457300 FAX: +44 (0) 1924 459487 E-MAIL: sales@ncsltd.co.uk

DRG.No. 4549/1 | PROJECT. P5774 | REV B



QUENCH TANK GENERAL ARRG'T
QTY: 1 OFF REQD

READ THIS DRAWING IN CONJUNCTION WITH DRAWING No's 4549/1/3/4

NOTES:

QUENCH MEDIA: WATER

TOTAL SUBMERSION OF CARRIAGE AND LOAD: <=10 SECONDS
FULL CARRIAGE TRAVEL ON SUBMERSION: <20 SECONDS
RAISE OF CARRIAGE & LOAD: 30 SECS MAX

TANK VOLUME: 60,750 LITRES
MASS OF TANK & STEELWORK: 25,000 KGS APPROX
LOAD MASS INC. TRAYS 8,000 KGS
MAX LOAD SIZE: 3 Mtr x 3 Mtr x 2 Mtr HIGH
MASS OF WATER: 60,750 KGS

TYPICAL LOADINGS ON PIT FLOOR DUE TO WATER MASS 30kN/m² EXCEPT FOR ADDITIONAL LOADINGS AS SHOWN LOCAL TO QUENCH FABRICATION, CARRIAGE BASE SUPPORTS & QUENCH HYDRAULIC LIFT MECHANISM

ALL LOADINGS SHOWN ARE STATIC LOADS. FATIGUE LOADINGS ON CONCRETE MUST BE TAKEN INTO ACCOUNT FOR LOAD AND WATER MOVEMENT INCLUDING VIBRATION.

MAXIMUM FASTENER SIZE IN CONCRETE M24 x 260mm LONG WITH A MINIMUM EMBEDMENT DEPTH OF 135mm TO GIVE A SWL IN TENSION OF 19.1kN USING A CHARACTERISTIC MINIMUM SPACING OF 300mm CRS. CONCRETE MINIMUM STRENGTH FOR FASTENERS 30N/mm² (C20/25)

DATE ISSUED: 15/04/19
INFORMATION ONLY:
PRELIMINARY:
APPROVAL:
MANUFACTURE:
SITE:
REVISED:
RETURN OF DRG'S
DOCUMENTS REQ'D:

IMPORTANT NOTE:

QUENCH PIT FLOOR MUST BE FLAT, LEVEL, MAXIMUM 15mm PACKING ALLOWANCE PERMITTED, ON COMPLETION ALL EQUIPMENT MUST BE GROUTED, BY OTHERS

TOLERANCING: Unless otherwise stated the following tolerances are to apply.
FABRICATION: Overall dimensions ± 5.00mm; Hole features ± 0.10mm; Machining ± 0.125mm
SQUARENESS: Diagonal dimensions must not vary by more than ± 5.00mm.
FLATNESS: Boxing or hogging must not exceed ± 5mm.

BRICKWORK: Unless otherwise stated brickwork should be laid smoothly with flat surface bed within ± 5mm. Maximum permissible step between each ± 2.00mm bricks or tiles. Overall dimensions should be within ± 5.00mm

WELDING: All joints and connections of RE. Sections to be continuously welded. Plate sections to be intermittent 75mm welded at 150mm pitch. unless otherwise stated.

DIMENSIONS IN MM.

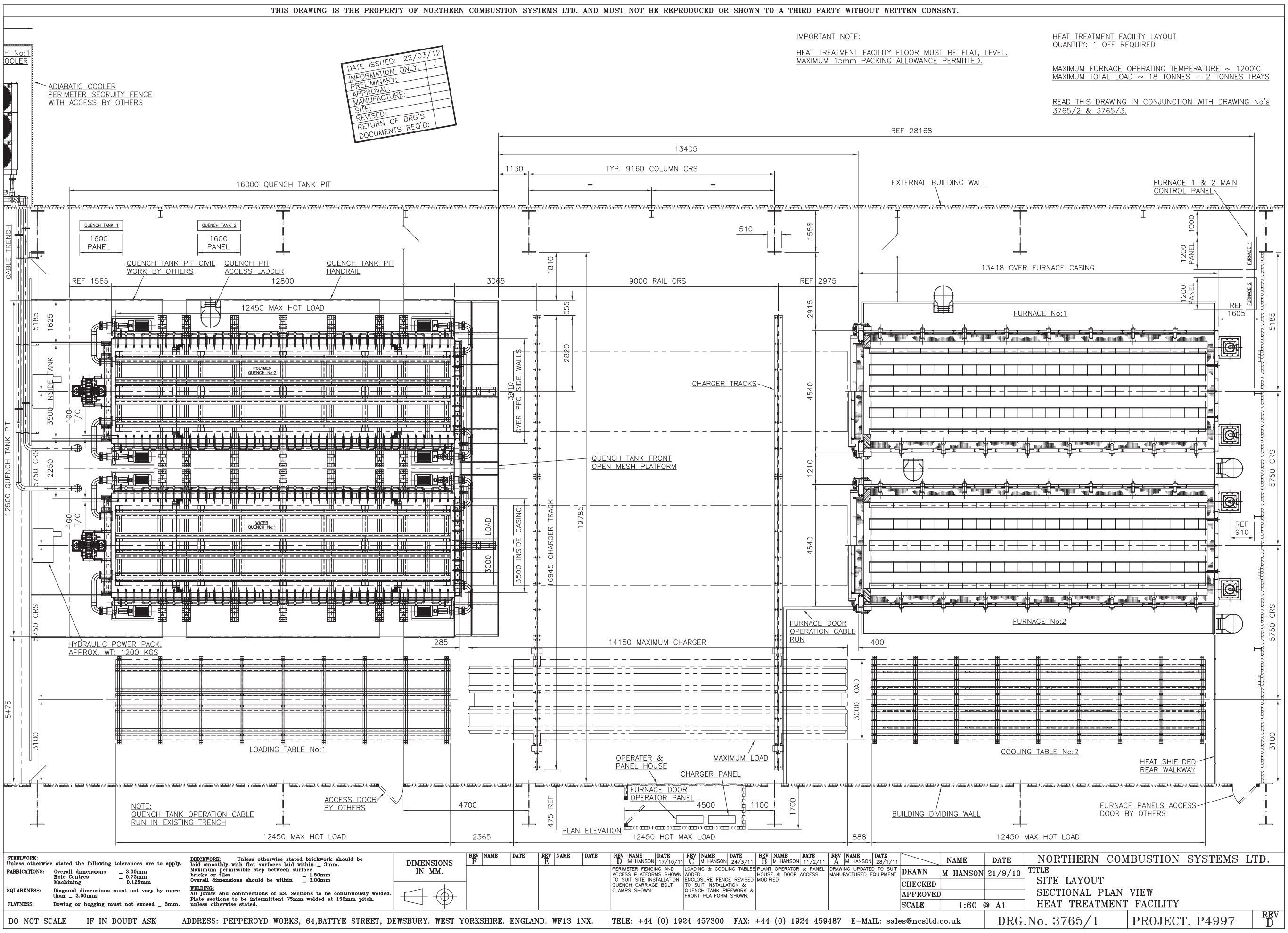
REV	NAME	DATE	DESCRIPTION
F			
E			
D			
C			
B	C.H	15.04.19	INCLUDES REFERENCES TO LIMIT / PROXIMITY SWITCHES: CR1—4 BE1—4 BR1—4 CSD, CUS
A	C.H	12.03.19	FOR APPROVAL.

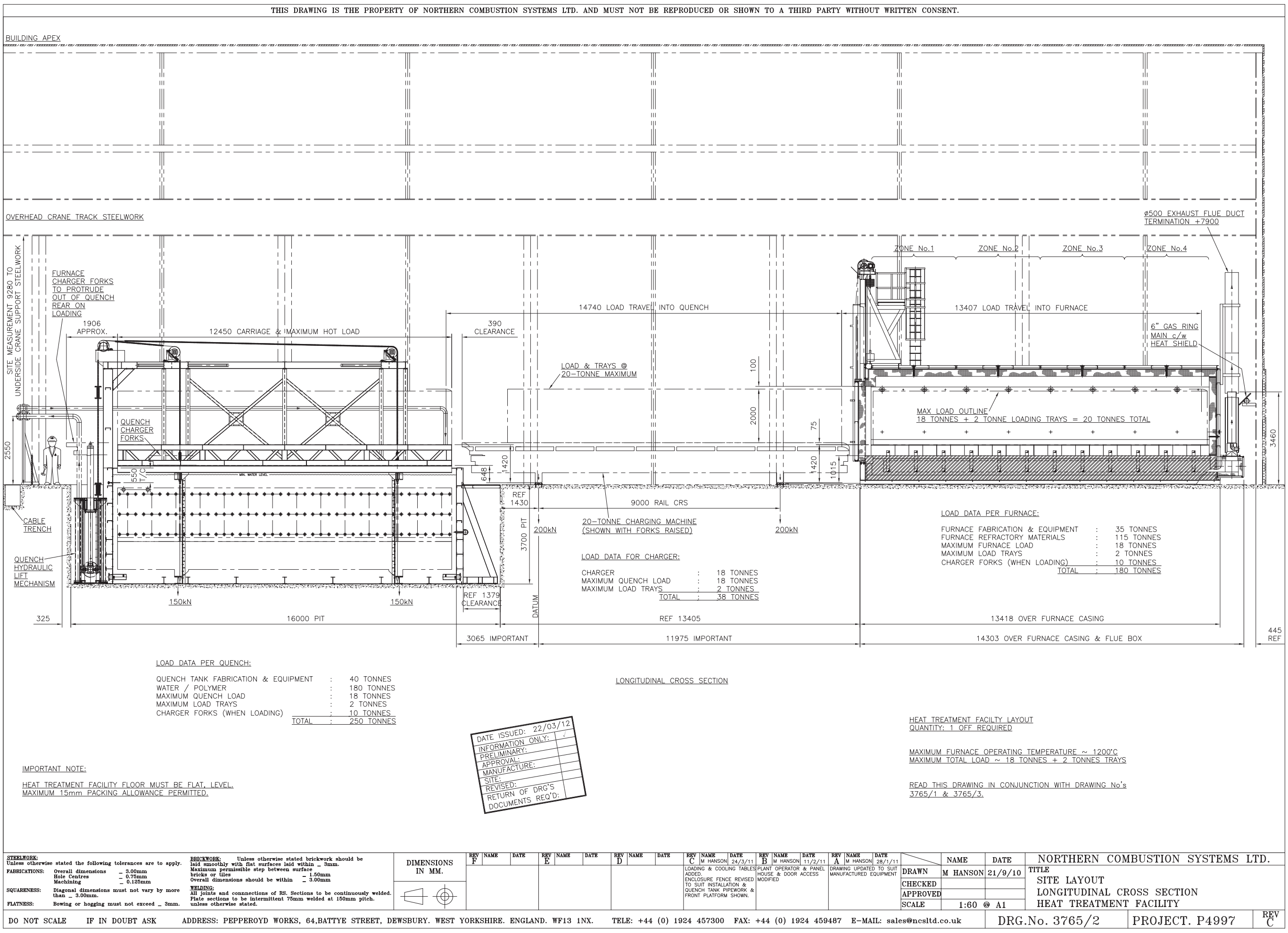
	NAME	DATE
DRAWN	M HANSON	11/02/19
CHECKED		
APPROVED		
SCALE	1:20 @ A1	

NORTHERN COMBUSTION SYSTEMS LTD.
TITLE: GENERAL ARRANGEMENT CROSS SECTION QUENCH TANK

DO NOT SCALE IF IN DOUBT ASK ADDRESS: PEPPERODY WORKS, 64,BATTYE STREET, DEWSBURY. WEST YORKSHIRE. ENGLAND. WF13 1NX. TELE: +44 (0) 1924 457300 FAX: +44 (0) 1924 459487 E-MAIL: sales@ncsltd.co.uk

DRG.No. 4549/2 | PROJECT. P5774 | REV B


THIS DRAWING IS THE PROPERTY OF NORTHERN COMBUSTION SYSTEMS LTD. AND MUST NOT BE REPRODUCED OR SHOWN TO A THIRD PARTY WITHOUT WRITTEN CONSENT.
DATE ISSUED: 22/03/12
INFORMATION ONLY:
PRELIMINARY:
APPROVAL:
MANUFACTURE:
SITE:
REVISED:
RETURN OF DRG'S
DOCUMENTS REQ'D:
IMPORTANT NOTE:
HEAT TREATMENT FACILITY FLOOR MUST BE FLAT, LEVEL. MAXIMUM 15mm PACKING ALLOWANCE PERMITTED.
HEAT TREATMENT FACILTY LAYOUT
QUANTITY: 1 OFF REQUIRED
MAXIMUM FURNACE OPERATING TEMPERATURE ~ 1200°C
MAXIMUM TOTAL LOAD ~ 18 TONNES + 2 TONNES TRAYS
READ THIS DRAWING IN CONJUNCTION WITH DRAWING No's 3765/2 & 3765/3.
ADIABATIC COOLER PERIMETER SECRUITY FENCE WITH ACCESS BY OTHERS
16000 QUENCH TANK PIT
13405
1130
TYP. 9160 COLUMN CRS
REF 28168
EXTERNAL BUILDING WALL
FURNACE 1 & 2 MAIN CONTROL PANEL
QUENCH TANK PIT CIVIL WORK BY OTHERS
QUENCH PIT ACCESS LADDER
QUENCH TANK PIT HANDRAIL
1600 PANEL
REF 1565
12800
3065
9000 RAIL CRS
REF 2975
13418 OVER FURNACE CASING
12450 MAX HOT LOAD
FURNACE No:1
FURNACE No:2
CHARGER TRACKS
QUENCH TANK FRONT OPEN MESH PLATFORM
3500 INSIDE TANK
3910 OVER PFC SIDE WALLS
3500 INSIDE CASING
16945 CHARGER TRACK
19785
12500 QUENCH TANK PIT
CABLE TRENCH
HYDRAULIC POWER PACK APPROX. WT: 1200 KGS
14150 MAXIMUM CHARGER
FURNACE DOOR OPERATION CABLE RUN
LOADING TABLE No:1
COOLING TABLE No:2
OPERATER & PANEL HOUSE
MAXIMUM LOAD
CHARGER PANEL
FURNACE DOOR OPERATOR PANEL
HEAT SHIELDED REAR WALKWAY
NOTE: QUENCH TANK OPERATION CABLE RUN IN EXISTING TRENCH
ACCESS DOOR BY OTHERS
BUILDING DIVIDING WALL
FURNACE PANELS ACCESS DOOR BY OTHERS
PLAN ELEVATION
12450 MAX HOT LOAD
2365
12450 HOT MAX LOAD
888
12450 MAX HOT LOAD
DIMENSIONS IN MM.
NAME DATE
DRAWN M HANSON 21/9/10
CHECKED
APPROVED
SCALE 1:60 @ A1
NORTHERN COMBUSTION SYSTEMS LTD.
TITLE SITE LAYOUT SECTIONAL PLAN VIEW HEAT TREATMENT FACILITY
DO NOT SCALE IF IN DOUBT ASK ADDRESS: PEPPEROYD WORKS, 64,BATTYE STREET, DEWSBURY. WEST YORKSHIRE. ENGLAND. WF13 1NX. TELE: +44 (0) 1924 457300 FAX: +44 (0) 1924 459487 E-MAIL: sales@ncsltd.co.uk
DRG.No. 3765/1
PROJECT. P4997
REV D


THIS DRAWING IS THE PROPERTY OF NORTHERN COMBUSTION SYSTEMS LTD. AND MUST NOT BE REPRODUCED OR SHOWN TO A THIRD PARTY WITHOUT WRITTEN CONSENT.
BUILDING APEX
OVERHEAD CRANE TRACK STEELWORK
ø500 EXHAUST FLUE DUCT TERMINATION +7900
ZONE No.1
ZONE No.2
ZONE No.3
ZONE No.4
SITE MEASUREMENT 9280 TO UNDERSIDE CRANE SUPPORT STEELWORK
FURNACE CHARGER FORKS TO PROTRUDE OUT OF QUENCH REAR ON LOADING
1906 APPROX.
12450 CARRIAGE & MAXIMUM HOT LOAD
390 CLEARANCE
14740 LOAD TRAVEL INTO QUENCH
13407 LOAD TRAVEL INTO FURNACE
6" GAS RING MAIN c/w HEAT SHIELD
LOAD & TRAYS @ 20-TONNE MAXIMUM
MAX LOAD OUTLINE 18 TONNES + 2 TONNE LOADING TRAYS = 20 TONNES TOTAL
QUENCH CHARGER FORKS
9000 RAIL CRS
20-TONNE CHARGING MACHINE (SHOWN WITH FORKS RAISED)
200kN
CABLE TRENCH
QUENCH HYDRAULIC LIFT MECHANISM
150kN
3700 PIT
REF 1379 CLEARANCE
DATUM
325
16000 PIT
REF 13405
13418 OVER FURNACE CASING
3065 IMPORTANT
11975 IMPORTANT
14303 OVER FURNACE CASING & FLUE BOX
445 REF
LOAD DATA FOR CHARGER:
CHARGER : 18 TONNES
MAXIMUM QUENCH LOAD : 18 TONNES
MAXIMUM LOAD TRAYS : 2 TONNES
TOTAL : 38 TONNES
LOAD DATA PER FURNACE:
FURNACE FABRICATION & EQUIPMENT : 35 TONNES
FURNACE REFRACTORY MATERIALS : 115 TONNES
MAXIMUM FURNACE LOAD : 18 TONNES
MAXIMUM LOAD TRAYS : 2 TONNES
CHARGER FORKS (WHEN LOADING) : 10 TONNES
TOTAL : 180 TONNES
LOAD DATA PER QUENCH:
QUENCH TANK FABRICATION & EQUIPMENT : 40 TONNES
WATER / POLYMER : 180 TONNES
MAXIMUM QUENCH LOAD : 18 TONNES
MAXIMUM LOAD TRAYS : 2 TONNES
CHARGER FORKS (WHEN LOADING) : 10 TONNES
TOTAL : 250 TONNES
LONGITUDINAL CROSS SECTION
DATE ISSUED: 22/03/12
INFORMATION ONLY:
PRELIMINARY:
APPROVAL:
MANUFACTURE:
SITE:
REVISED:
RETURN OF DRG'S
DOCUMENTS REQ'D:
HEAT TREATMENT FACILTY LAYOUT
QUANTITY: 1 OFF REQUIRED
MAXIMUM FURNACE OPERATING TEMPERATURE ~ 1200°C
MAXIMUM TOTAL LOAD ~ 18 TONNES + 2 TONNES TRAYS
READ THIS DRAWING IN CONJUNCTION WITH DRAWING No's 3765/1 & 3765/3.
IMPORTANT NOTE:
HEAT TREATMENT FACILITY FLOOR MUST BE FLAT, LEVEL. MAXIMUM 15mm PACKING ALLOWANCE PERMITTED.
DIMENSIONS IN MM.
NAME DATE
DRAWN M HANSON 21/9/10
CHECKED
APPROVED
SCALE 1:60 @ A1
NORTHERN COMBUSTION SYSTEMS LTD.
TITLE SITE LAYOUT LONGITUDINAL CROSS SECTION HEAT TREATMENT FACILITY
DO NOT SCALE IF IN DOUBT ASK ADDRESS: PEPPEROYD WORKS, 64,BATTYE STREET, DEWSBURY. WEST YORKSHIRE. ENGLAND. WF13 1NX. TELE: +44 (0) 1924 457300 FAX: +44 (0) 1924 459487 E-MAIL: sales@ncsltd.co.uk
DRG.No. 3765/2
PROJECT. P4997
REV C