PRACTICAL ACTION
Technology challenging poverty

technical brief

TECHNICAL DRAWINGS – LOW-COST WASTE INCINERATOR OVERVIEW

Introduction

These drawings are an overview of the two chambers and the external ducting, with more details of each component in subsequent drawings. The low-cost incinerator consists of an inner refractory-brick built incinerator surrounded by an outer protective wall made from standard cement blocks. The incinerator is a simple two-chamber design with vertical sidewalls and a low sprung arch roof. The walls are double thickness to provide both structural stability and high thermal mass. The roof is single brick with a thick layer of sand on top to provide a high degree of thermal mass and is sprung between steel buckstays, which are situated between the inner and outer walls. The outer wall is a vertical wall, without a roof, that follows the contour of the incinerator.

Primary Chamber

The primary chamber consists of a simple tunnel design with a low arched roof. Combustion takes place on a stepped grate system consisting of three grates (one drying and two combustion grates) inclined at 20° from the feed (front) end of the incinerator and a burn out pit. The top grate is the drying grate and consists of a solid floor made from refractory brick. The two lower grates are combustion grates and are made from perforated refractory bricks sitting on top of a steel primary-air plenum. Primary combustion air can also be provided from the side slightly above the grates. Combustion takes place under sub-stoichiometric conditions and using natural draught.

Secondary Chamber

The secondary chamber starts as a tunnel with a low arched roof, situated above the middle combustion grate and at right angles to the primary chamber, after which it forms an 'S' shape chamber, forcing hot gases to pass first vertically downwards, then vertically upwards. Secondary air is by forced draught and enters the chamber just at the start of the chamber. After the secondary chamber the hot gases pass into the tertiary chamber (the stack) where they are cooled by mixing with cool air.

Roof

The low arched roof of the incinerator is supported by buckstays, located within the gap between the incinerator and the outer wall, and tensioned using tie bars. Sheet steel is braced between the buck stays and the gap produced between the sheet steel and the incinerator wall is then backfilled with fine sand to provide a seal, so helping to reduce the likelihood of air ingress into the combustion chamber and also acting as a low-cost insulation material.

How it works

Municipal Solid Waste (MSW) is fed from the drying grate end of the primary chamber and residuals removed from the other. Stoking is manual, using a combination of agitators and raddles on the grates and forcing the MSW onto the drying grate from the feed chute.

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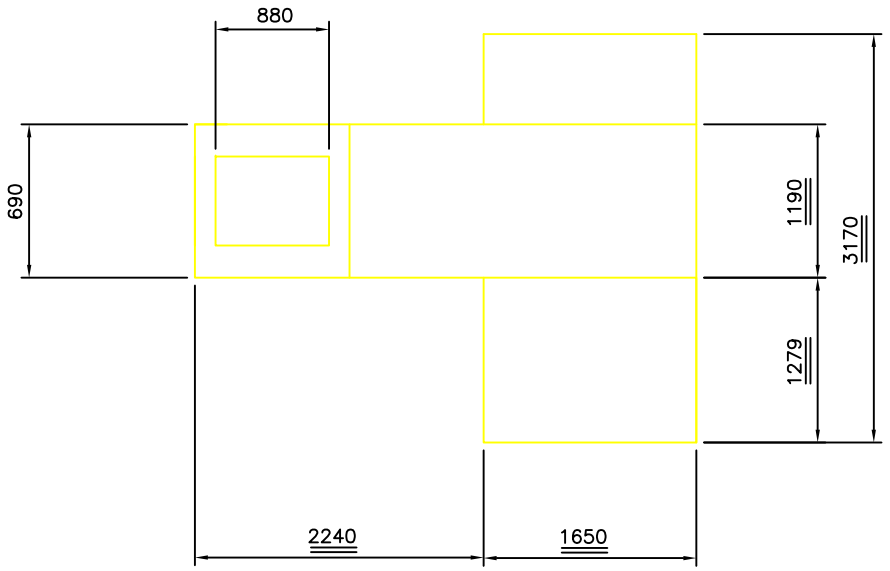
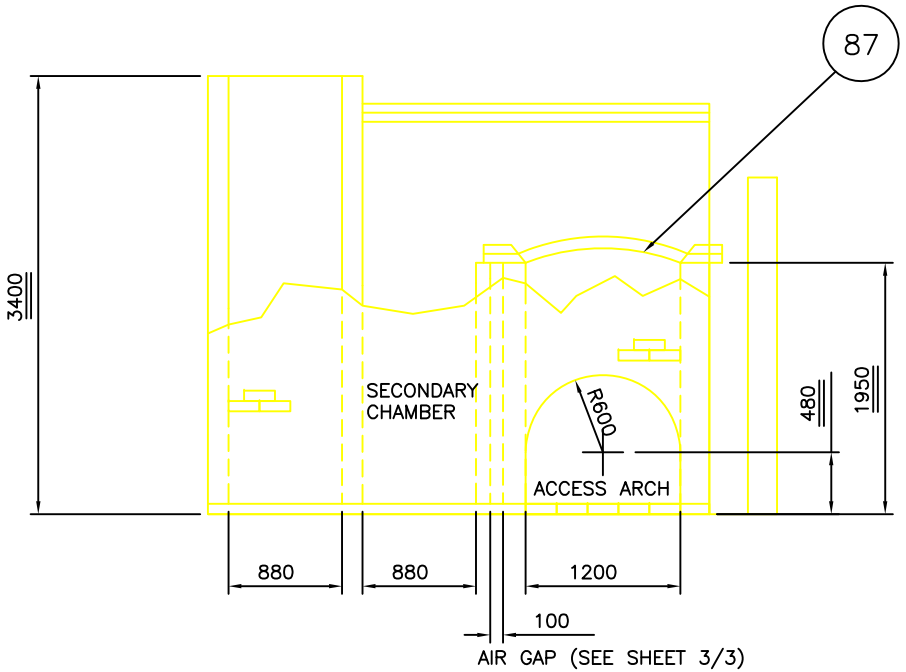
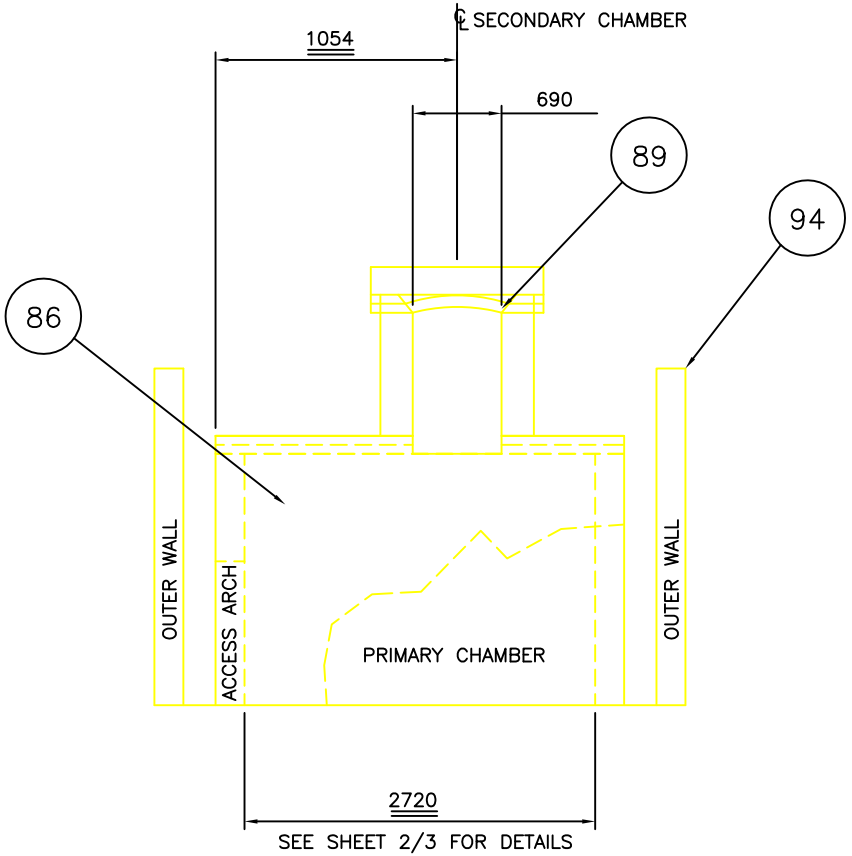


1–DIMENSIONS WITH DOUBLE UNDERLINE ARE APPROXIMATE TO ALLOW VARIATIONS IN BRICK & MORTER THICKNESS
2–FOR REFRENCES SEE PARTS LIST GFD09–PA001





No	DESCRIPTION	CHK'D	APP'D	DATE

REVISIONS

MATERIAL

TITLE
G.A–COMBUSTION CHAMBER EXTERNAL DETAIL

QTY	DRAWN	TRACED	CHECKED	APPROVD	DATE	SCALE

All dimensions in millimetres unless otherwise stated.

DRAWING No. GFD02–101 SHEET 1/3

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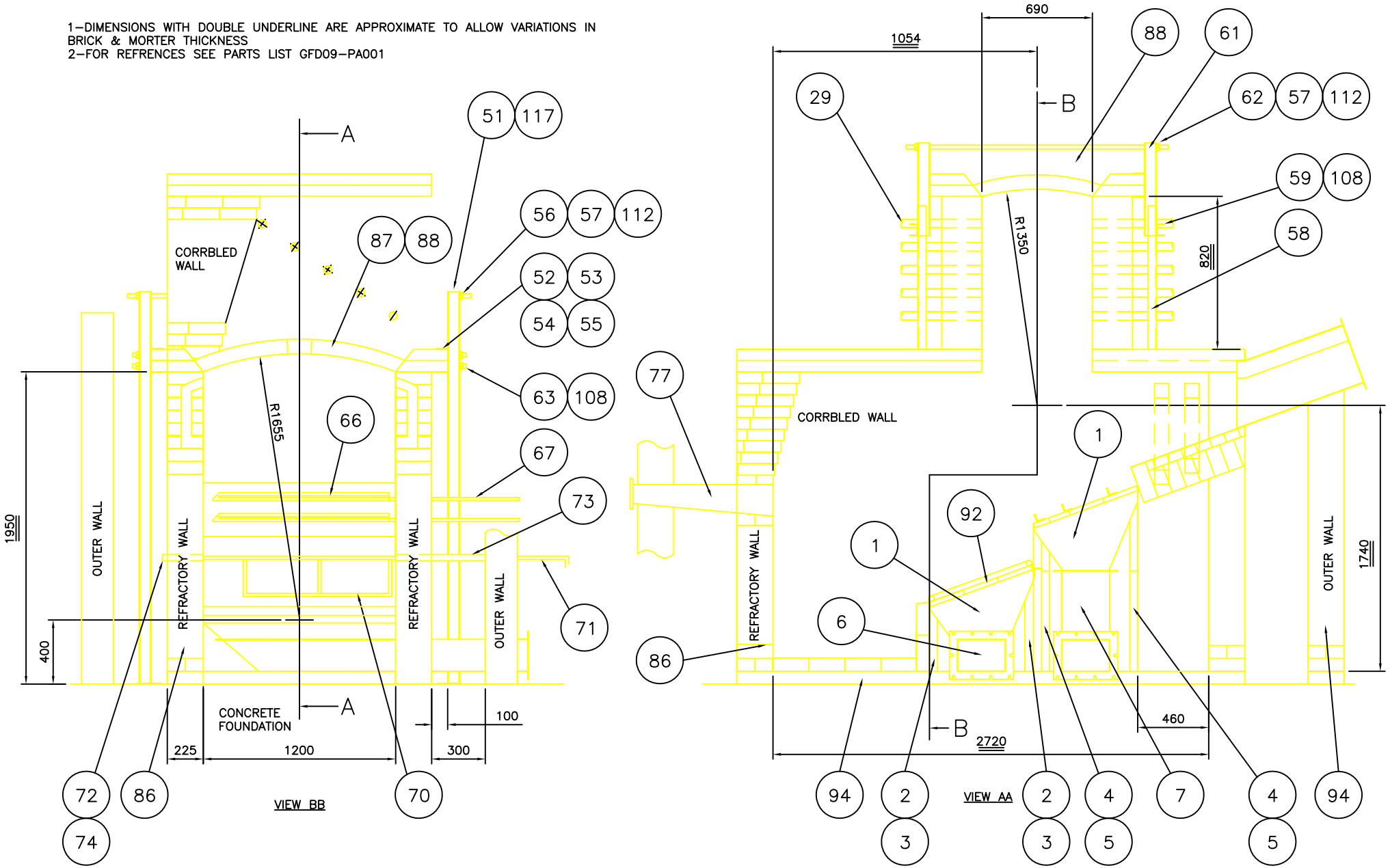

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REVISIONS

MATERIAL

TITLE
G.A.–COMBUSTION CHAMBER INTERNAL DETAIL – PRIMARY

QTY	DRAWN	TRACED	CHECKED	APPROVD	DATE	SCALE

All dimensions in millimetres unless otherwise stated.

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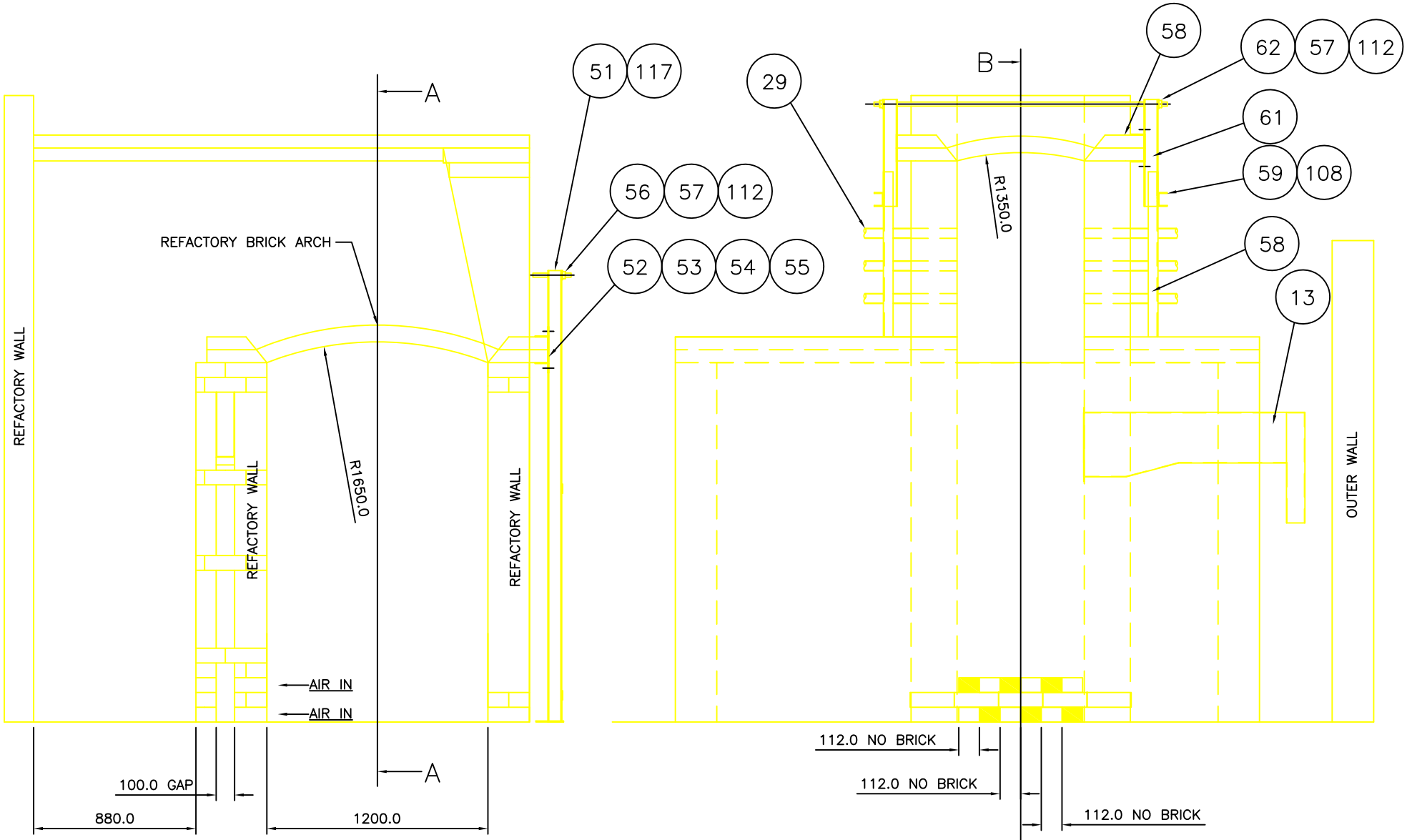

VIEW BB

VIEW AA

1–DIMENTIONS WITH DOUBLE UNDERLINE ARE APPROXIMATE TO ALLOW VARIATIONS IN BRICK & MORTER TICKNESS
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No	DESCRIPTION	CHK'D	APP'D	DATE

REVISIONS

MATERIAL

TITLE
G.A. COMBUSTION CHAMBER

QTY	DRAWN	TRACED	CHECKED	APPROVD	DATE	SCALE

All dimensions in millimetres unless otherwise stated.

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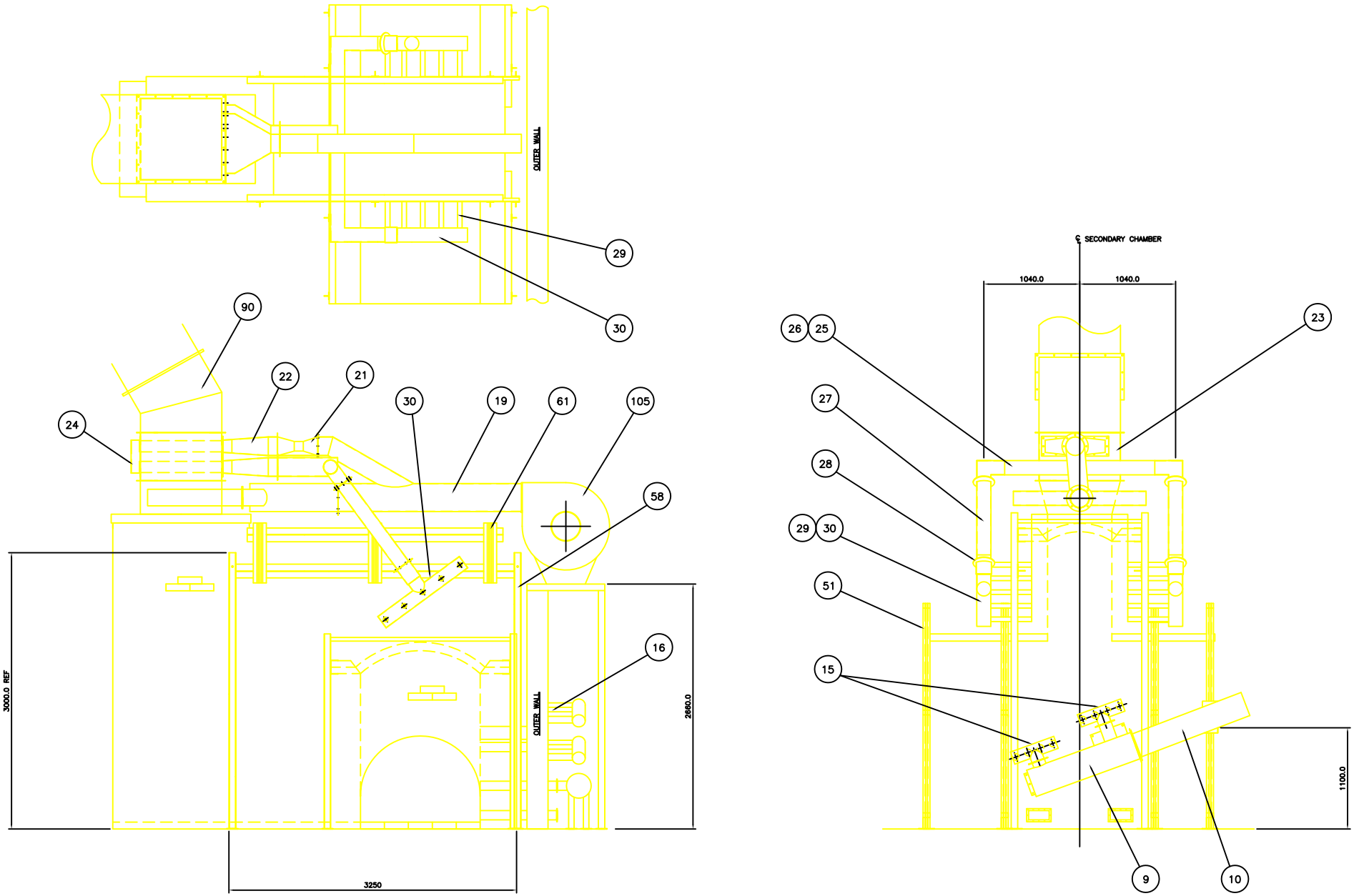

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REVISIONS

MATERIAL

NOTE
FOR REFERENCES SEE PARTS LIST
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TITLE

GA–EXTERNAL DUCTING

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