

## H. & R. JOHNSON (INDIA) LIMITED

Plant :  
Plot No. 1-12, KIADB Indl. Area, Near Anchepalya Village,  
Kunigal-572 126, Tumkur Dist, Karnataka, India.  
Tel : 08132 - 220358/359 • Fax : 08132 - 220357.  
E-Mail : kunigal@hrjohnsonindia.com



Date: 14.04.2005

To Whom It May Concern

### Biomass Based Hot Air Generator - Commissioning Report

This is to certify that the biomass based hot air generator, supplied by M/s Radhe Renewable Energy Development, at Kunigal plant of H&R Johnson (I) Limited has been installed, tested and successfully commissioned. The installation has been handed over to HRJ.

Training to Operators : Satisfactory.  
Equipment Operations : Satisfactory.  
Hot Air Temperature : Achieved 650 to 675 deg C.  
Spray Dryer Output : Achieved 8.5 tons per hour.

A separate detailed report regarding the operational problems faced and remedial action taken is jointly prepared and attached.

For H&R JOHNSON (I) LTD

For RADHE RENEWABLE ENERGY  
DEVELOPMENT PVT. LTD.

1.   
Venkatesh Murthy

1.   
Jayantibhai

2.  
S.R. Jana



2.   
Kishore Vyas



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<b>Minutes of Meeting</b>		<b>Date: 14 Apr 2015</b>	
		<b>Time:</b>	
		<b>Location: Kunigal Plant</b>	
<b>Meeting called by:</b>	Plant Project Dept		
<b>H&amp;R Attendees:</b>	GHC, VM, SRJ	<b>Attendees:</b>	Kishore Vyas, Jayanti Bhai
<b>Minutes</b>			
<b>Agenda item:</b>	Kunigal HAG – Annexure to the Commissioning Report		
<p>Attendees of the meeting have agreed on the following problems and issues and have resolved to below mentioned remedial measures:</p> <ol style="list-style-type: none"> <li>1. <b>Clinker Formation:</b> Clinker formation has occurred several times and has resulted in unwarranted shutdown of the system hampering production targets and schedules. Reason attributed to sand contamination in the biomass which has a lower fusion temperature and high quantity of biomass resulting in inconsistent feed control. It was agreed to try and source biomass with lower ash content. Training was provided to operating personnel regarding the control of feed rate w.r.t. temperature requirement.</li> <li>2. <b>Pollution:</b> Excessive collection of fine ash in cyclones and rotary airlock valves resulting in lower dust removal efficiency in the cyclones. Reason again attributed to higher ash content. It was agreed to try and source biomass with lower ash content. Training was provided to operating personnel regarding the frequency of releasing the air lock valves.</li> <li>3. <b>Feed quantity and variation:</b> Different sources of biomass exhibit certain distinct combustion behavior. This contributes to variation in hot air temperature. Problem is compounded because of the higher quantities of fuel handled (in terms of volume). This problem is to be tackled by homogenizing the stocks as much as possible so that variations are minimized.</li> <li>4. <b>Feed Channel Jams:</b> The feed channel gets jammed sometimes, especially when the biomass is wet. Reason identified as poor mobility of the biomass when wet. It was suggested to age the biomass as much as possible to allow the moisture to homogenize as much as possible. Training also provided to operators to fire-fight such situations.</li> <li>5. <b>Suction:</b> The HAG was in positive pressure owing to lower suction capacity w.r.t. HAG requirement as it is directly connected to the spray dryer. The exhaust fan capacity was enhanced by replacing the fan to induce a negative pressure in the HAG.</li> </ol>			
<p><b>Conclusions:</b></p> <p>All problems are repetitive in nature and there can not be a corrective action that would avoid such situations. Operating personnel acknowledge this fact. This arises from the different sources of biomass and its properties. It is decided to provide adequate training to be provided to operators to tackle such problems. On the supply side, care shall be taken to minimize the sources without affecting quantity of supply and sufficient stocking of the biomass will also be tried as and when possible.</p>			
<b>Action Items</b>	As listed above	<b>Person responsible</b>	<b>Deadline</b>
✓			
✓			
✓			
✓			

<b>Minutes of Meeting</b>		Date: 20 May 2006	
		Time:	
		Location: Kunigal Plant	
Meeting called by:	Plant Project Dept		
HRJ Attendees:	GNC, VM, SS, SRJ, SPR	Attendees:	
<i>Minutes</i>			
Agenda Item:	Kunigal HAG – Performance Review		
<p>The performance of HAG has been reviewed.</p> <ol style="list-style-type: none"> <li><b>Operation &amp; Maintenance:</b> There are regular problems related to temperature variation and clinker formation. These are being attended as and when necessary. Major issues have been             <ol style="list-style-type: none"> <li>Wear out of the ash collection cyclone due to fine abrasive dust eroding the cyclone and</li> <li>Damage to the roof of the HAG due to temperature variations and resultant shocks.</li> <li>Cyclone had to be replaced and the roof had to be re-worked again. The roof design has been changed to reduce such problems in future. Shutdown period for the above two jobs was 4 days (2 days in April 06 for roof change and 2 days in Sep 06 for cyclone replacement) at the rate of Rs.70 per sqm summing up to Rs. 5.74 Lakhs per day (loss of contribution considering a production of 8200 sqm/day) of shutdown.</li> </ol> </li> <li><b>Ash:</b> Ash generated has been practically estimated to be about 3.5 tons a day. The tile body has been formulated accordingly to incorporate 2% (3.6 tons/day) of ash and is being consumed accordingly. However, in case of higher ash generation due to any reason, this is being dumped in the plant premises for future use. This is done to avoid frequent changes to the tile body formulation.</li> <li><b>Sourcing:</b> Sourcing has been streamlined. Contracts with several suppliers are being honored. The concern is the variation in properties of biomass from different suppliers and seasonal price variations. It is planned to keep an additional buffer stock during monsoons. Whenever feasible, homogenization of biomass is being done to minimize the temperature variations. Actual moisture content varies and is normally in the range of about 5-10%. When moisture is higher, the consumption is also higher.</li> </ol>			
<p><b>Conclusions:</b></p> <p>Above issues have been addressed. Necessary care to be taken to identify potential problem areas and approach them in a proactive manner.</p>			
<b>Action items</b>	<b>As listed above</b>	<b>Person responsible</b>	<b>Deadline</b>
✓			
✓			
✓			
✓			