Cyclone separator design spreadsheet

There are different processes of dust collection in the gas stream (see global overview here), among them, hurricanes are probably one of the most widespread solution, in any industry. Cyclone dust collectors are fairly simple from a mechanical point of view and therefore generally provide a cost-effective solution. However, assessing the performance of a hurricane and designing new equipment for a particular application is not always well understood, and there are often only partial publications. The goal of this page is to provide step-by-step approach to the design of the cyclone dust complex. This can be enough to quickly verify the performance of the current hurricane or during the pre-design phase, however one should calculate that the methodology below is not suitable for the detailed design that should be implemented with the reputable supplier that is likely to be refining the original account codes provided in literature and making them more accurate. One should also note that the method given is only one of several published models that may have different accuracy. Article in development, please stay on top of 2 updates. Hurricane applications Where do you use hurricanes? Hurricane dust collectors are especially used in the following applications: - Plastic: after the transfer of pellets, to catch plastic dust - wood industry: to collect dust from sawmills - chemicals: to collect dust from the process or at the end of the air transmission line to control emissions - agriculture: to deduce the air used to transfer the material to the cyclone silo efficiency directly related to its geometry, which was the subject of various research. From this research, a set of standard dimensions was identified. These dimensions, or rather proportions, form the basis of most design throughout the industry. It is recommended to maintain those standard configurations, or some adaptation by reputable suppliers, not modify them. It is still possible to develop a specific design for specific high value applications (FCC for example) but it goes beyond the methodology presented here, requiring a thysm, experimental experiments ... Etc... The table below is due to Koch and Licht (1977) and summarizes the work of various authors (Apple, Stairmand...) Table 1: Standard cyclone geometries for an transverse input linked to all dimensions of hurricanes to dc diameter. Figure 1: Hurricane drawing and distinctive geometry labels 4. Hurricanes step-by-step design guide how to design hurricanes? This design guide is based on works published by Bohnet in 1997. The approach is suitable for standard hurricanes with square transverse entries with small dust loading in a maximum order of 10 g/ m3. For different types of dust loads or entry loads, some corrections are required. Model Health: As mentioned above is a good model for estimating From the hurricane in basic design or troubleshooting but gives errors up to 40% vs. experiments, depending on the circumstances, therefore details should be calculated with the help of a company specializing in cyclone design and having improved the account code. 4.1 Calculate K ratios if you design a new hurricane, choose one of the standard geometry in Table 1 and assumedc diameter. If you test an existing hurricane, select different ratios of the actual equipment you are evaluating. K ratios: KH, KB, KS, Ki, KL, KZ, KD from Table 1 or Actual Hurricane Dimension 4. 2 Calculation of the following geometric dimensions with: Ae = product inlet area section (M2) Ai = gas outlet area section (M2) re = radius of the gas outlet tube (m) = average radius of liquid vein (m) Af = powder friction area on both sides of the cyclone () M2) KB = BC/DC KH = HC/DC Ki = Di/DC KL = Lc/Lc/Dc KZ = Zc/Dc KS = Sc/Dc = Cyclone diameter (m) with: Vc = volumetric flow of continuous stage (gas) (m3/s) uCe = entry speed (m/s) uCi = port speed (m/s) ki = Di/Dc KB = BC/DC = HC/Dc = cyclone diameter (m) with: Ce = contraction coefficient in Entrance Ki = De/DC KB = BC / DC KH = HC / DC uCe = inlet speed (m/s) uCC = speed of cyclone walls (m/s) Rec = Reynolds number +μc = continuous phase viscosity (gas) (Pa. s) Dc = cyclone diameter (m) φc = continuous phase density (kg/m3) Cf = friction coefficient with The united nations is the only country in the world that has been able to provide the necessary resources for the implementation of the programme. The refore, the use of the term the right to use is not a right but a right or right or right or right or a, and that the term the right to be used is not a right or right or a right or right or a right or right. This means that the cyclone will capture 50% of the particles having this diameter in the gas stream and will allow through 50%. With: uCri = gas speed in radius rei (m/s) μc = viscosity of continuous stage (gas) (Pa.s) Ki = D/Dc = cyclone diameter (m) Φτ = difference in density (kg / m3) uCφi = (m/s) the competencies are calculated relatively to cut diameter. Larger particles will lead to better efficiency. Smaller particles to reduce efficiency. The Φ factor used in the account is usually in order of 3 (+/-1). di = diameter particle i whose efficiency is calculated (m) DC = diameter cut (m) with: ΦPc = cyclone pressure depression (Pa) ξc = total pressure diameter coefficient of ξce = low pressure coefficient in the inlet and inside the ξci hurricane = decompression coefficient in the cfi port = 0.70 to 0.75 A simplified version of the calculation tool Can be found here - a more complete tool will be developed soon. Note that this tool cannot be used to design details as mentioned in the file, always link with a trading company to confirm the design. Bohnet Sources 1997 Volume 15, Issue 2 first published: July 24, 2007 hurricanes and hydrogen widely used for solid gas and liquid solid particle separating, respectively. The main advantage is the presence of a centrifuge field. The concept of balance zone is one of the most used ways to design equipment. This work revisits the design equations of non-spherical particles and compares the design results taking into account non-spherical geometry with results taking into account spherical geometry and correcting values to non-spherical particle geometry. An educational spreadsheet has been prepared for analysis and education, and depending on the shape of the particles and on the direction of the particles, errors can be obtained up to 38% in cutting diameter and 10% in global assembly efficiency. How to use this spreadsheet Note: This spreadsheet is for the use of knowledgeable professionals, able to evaluate the accuracy of... How to use this spreadsheet Note: This spreadsheet is for the use of knowledge professionals, able to evaluate the accuracy of the results. The author is not responsible for the use that these results were developed. 1 The cyclone size sheet calculates the dimensions of various standard hurricanes. Enter the flow rate, design the inlet speed and gas density in colored squares, the paper will give dimensions to five standard hurricanes - two high efficiency, three low efficiency. The table also gives the expected low pressure, but you should be aware that this is a very uncertain calculation (see original references). See the 'Chart' paper for the label. On the hurricane size sheet you select the units you want to use - metric or u.S. customary (imperial) this unit selection applies to all 2 leaves are provided two ways to calculate the efficiency of the hurricane. You can calculate both, and compare the results on the chart. Both attributes are set up with the same layout, so that data between the sheets can be easily copied. 3 Efficiency calculation requires particle size data, cyclone dimensions, and physical Data for gas and solids. The calculation assumes that the distribution of particle size is usually a distributed record. The paper is prepared so that you can enter either the standard and average deviation from the normal log distribution or particle size data, which is then calculated. 4 Procedure for efficiency calculations: a) Enter cyclone dimensions in cells from D4 to D11. If you have calculated these using this spreadsheet, the values in the cells can be copied from 13 to 20 to design the selected hurricane directly to D4 to D11. Note: Paste special values - don't just copy cells. b) Enter the gas property data in the D18 cells to D21. c) Enter particle data in D26 cells to D29. If you enter the standard and average deviation, and select 'N' for cell D28, then the total efficiency is immediately given in the H15 cell, and the input and input size distributions in the O21 and R21 cells are given to R41. d) If you want to use the size distribution method, enter 'Y' in the D28 cell, then range limits starting from the N50 cell and the corresponding% in the range starting with the O50. If you want to use more than nine ranges, you can expand these columns to as many rows as you want - just remember to copy formulas in the M and P columns through T in which rows you add. After entering the size distribution data, you must run the regression tool. Choose the list of tools, analyze the data, and then decline. For the 'X' value, pick all the values in the Q column, starting with Q50; For 'Y' values, choose all values in the T column, starting with T50. For 'output range' enter V48. You will get a message saying the results will overwrite the cells - choose OK. Once the retreat is performed, the results are available, as shown in c) above. 5 Chart the breakthrough graph sheet (col P = 1 - efficiency fractions) against particle size for two efficiency calculation methods. Caution: The two efficiency sheets are not linked, so make sure they are calculated from the same data if you want to compare my efficiency calculations! 6 The spreadsheet is protected to prevent accidental writing of formats. However, no password is necessary to unlock, so you can freely adapt it to suit your purposes. Download live from password 1236 1236