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| --- | --- | --- | --- | --- | --- |
|  | **Oz. Avoir.** | | **Cub. In.** | **Gallon.** | **Rep. 1758.** |
| Pint Quart Gallon  Bushel | 20∙00  40·35  156·25  1229∙85 | 34∙6 (×8=)  69·8 (×4=)  270∙4 ( = ) 2128·9 (×⅛=) | | 276·9  279∙3  270∙4  266∙1 | 34∙8  70∙0  271·0  2124∙0 |

of length and of weight, which may be considered as already sufficiently well ascertained. But with respect to the mea­sure of capacity, it appears from the Report contained in the Appendix (A), that the legal standards of the highest authori­ty are considerably at variance with each other; ; the standard gallon, quart, and pint of Queen Elizabeth, which are kept in the Exchequer, having been also apparently employed, almost indiscriminately, for adjusting the measures both of corn and of beer ; between which however a difference has gradually, and, as it may be supposed, unintentionally, crept into the practice of the excise ; the ale gallon being under­stood to contain about four and a half per cent. more than the corn gallon, though we do not find any particular act of parliament in which this excess is expressly recognised. We think it right to propose that these measures should again be reduced to their original equality ; and at the same time, on account of the great convenience which would be derived from the facility of determining a gallon and its parts, by the operation of weighing a certain quantity of water, amounting to an entire number of pounds and ounces with­out fractions, we venture strongly to recommend that the standard ale and corn gallon should contain exactly ten pounds avoirdupois of distilled water at 62° Fahrenheit, being nearly equal to 277∙2 cubic inches, and agreeing with the standard pint in the Exchequer, which is found to contain exactly twenty ounces of water.

“ VIII. We presume that very little inconvenience would be felt by the public from the introduction of this gal­lon in the place of the customary ale gallon of 282 cubic inches, and of the Winchester corn gallon, directed by a statute of King William to contain 269, and by some later statutes estimated at 272¼ cubic inches ; especially when it is considered that the standards by which the quart and pint beer measures used in London are habitually adjusted, do not at present differ in a sensible degree from the standard proposed to be rendered general. We apprehend also that the slight excess of the new bushel above the common corn measure would be of the less importance, as the customary measures employed in different parts of Great Britain are almost universally larger than the legal Winchester bushel.

“ Appendix (A). The standards kept at the Exchequer, for the adjustment both of corN and beer measures, are a bushel, a gallon, and a quart, dated 1601, and a pint, dated 1602, all marked with an E and a crown. They were exa­mined by Sir George Clerk and Dr Wollaston, and the weight of Thames water which they held, at the tempera­ture of 52°, was found as in the subjoined table. Now, since, according to Sir George Shuckburgh’s experiments, a cubic inch of distilled water at 60° weighs 252½ grains, the specific gravity of the water being to that of distilled water as 1·00060 to 1, and the apparent specific gravity of distilled water, in a vessel of brass at 52°, being to that of water at 62° as 1∙00046 to 1, it follows that the apparent specific gravity of the water employed was 1∙00106, and that an ounce avoirdupois corresponded to l∙731 cubic inches. Hence we obtain the contents of the measures in cubic inches, which are compared in the table with the more di­rect measurement of Mr Bird and Mr Harris, reported to the House of Commons in 1758.

“The Exchequer standard wine gallon is dated 1707, and was found to contain l33∙4 ounces, answering to 230∙9 cubic inches. An experiment of Dr Wollaston and Mr Carr, in 1814, gave 230∙8, the mean being 230·85 ; while the measurement of 1758 made it 231·2. A duplicate of this measure, and of the same date, is kept at Guildhall.

“ Dr Wollaston and Mr Carr examined also the three other wine gallons at Guildhall. The oldest of these seems to be the same that was measured by Halley and Flamsteed in 1688, and was said to contain 224 cubic inches: its ac­tual capacity is 224·4. The wine gallon of 1773, which is in daily use for adjusting other measures, was probably in the first instance a correct copy of the Exchequer gallon, but has been reduced by a bruise and by the wear of the brim to 230·0 cubic inches, having lost 4/5 of a cubic inch, or 1/300 of its whole capacity. The wine gallon of 1798 contains 230·8 cubic inches.

“ The Excise WINE gallon was found by a similar experi­ment to contain 230∙1 cubic inches, having partaken of the progressive deficiency of the Guildhall gallon, from which it was derived.”

*Second Report*—“We have examined, since our last Report, the relation of the best authenticated standards of length at present in existence, to the instruments employed for measuring the base on Hounslow Heath, and in the late trigonometrical operations; but we have very unex­pectedly discovered that an error has been committed in the construction of some of those instruments. We are therefore obliged to recur to the originals which they were intended to represent, and we have found reason to prefer the parliamentary standard executed by Bird in 1760, which we had not before received, both as being laid down in the most accurate manner, and as the best agreeing with the most extensive comparisons which have been hitherto executed by various observers, and circulated throughout Europe ; and, in particular, with the scale employed by the late Sir George Shuckburgh.

“ We have therefore now to propose that this standard be considered as the foundation of all legal weights and measures, and that it be declared that the length of a pen­dulum vibrating seconds in a vacuum on the level of the sea, in London, is 39Ί3929 inches, and that of the French metre 39·37079 inches, the English standard being employ­ed at 62° of Fahrenheit.”

*Third Report.—*“ The measurements which we have lately performed, upon the apparatus employed by the late Sir George Shuckburgh Evelyn, have enabled us to deter­mine with sufficient precision the weight of a given bulk of water, with a view to the fixing the magnitude of the stan­dard of weight, that of length being already determined by the experiments related in our former Reports ; and we have found by the computations, which will be detailed in the Appendix, that the weight of a cubic inch of distilled water at 62° of Fahrenheit is 252·724 grains of the parliamentary standard pound of 1758, supposing it to be weighed in a vacuum.”

*Appendix.—*The commissioners having been furnished, by the kindness of the Honourable C. C. C. Jenkinson, with the apparatus employed by the late Sir George Shuckburgh Evelyn in the determination of the magnitude of the stan­dard weights, and there being some doubt of the perfect ac­curacy of his method of measuring the capacity of the bodies employed, it was judged necessary to repeat that measure­ment with greater precautions ; and the results of Captain Kater's experiments have afforded some slight corrections of the capacities in question.

“ The sides of Sir George Shuckburgh’s cube were found by Captain Kater equal to 4∙98911, 4·98934, and 4∙98935 inches, the diameter of the cylinder 3∙99713, and its length 5∙99600 inches ; and the diameter of the sphere 6∙00759 inches. Hence the content of the cube appears to be 124∙1969 inches ; that of the cylinder 75·2398 ; and that of the sphere 113·5264 inches of Bird’s parliamentary standard of 1760, recommended in the last Report of the commis­sioners, or of the standard made by Troughton for Sir George Shuckburgh.

“ The difference of the weight of the cube in the air at 62°,