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MINIMUM FUNDING REQUIREMENT: SPECIMEN CALCULATIONS

BY THE TECHNICAL SUPPORT AND RESEARCH COMMITTEE OF THE PENSIONS BOARD

ABSTRACT

These calculations of the Minimum Funding Requirement replace those that were issued with version 1.0 of GN27, which were made obsolete by the issue of version 1.1.

KEYWORDS

Specimen Calculations; Minimum Funding Requirement (MFR); Guidance Note 27 (GN27)

1. INTRODUCTION

The specimen calculations that follow have been produced by the Technical Support and Research Committee of the Pensions Board to illustrate how to perform the calculations required under the Occupational Pension Schemes (Minimum Funding Requirement and Actuarial Valuations) Regulations 1996. These calculations have been calculated in accordance with version 1.1 of Guidance Note 27 (GN27) which became effective from 6 April 1997. The calculations replace those that were issued with version 1.0 of GN27, which were made obsolete by the issue of version 1.1. The effective date of the calculations is 1 September 1995.

2. SPECIMEN MFR CALCULATIONS

2.1 *Scheme Data*

These are:

— the normal retirement age (NRA) is 65 years;
— early retirement is possible at the member's option (without the employer's or trustees' consent) from age 55 without reduction;
— once in payment, 50% of the pension escalates at LPI and the rest is fixed; and
— all pensions are payable monthly in advance, have a 5-year guarantee with overlap and carry 50% survivor's pension on death before and after retirement.

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2.2 *Membership Data (All Males)*

Member	Age	Annual pension before statutory revaluations
A	35	£1,000
B	52	£1,000
C	55	£1,000
D	70	Pension in payment = £500 non-escalating plus £500 escalating @ LPI

2.3 *Yields on Relevant Indices and MVAs as at 31 August 1995*

	FT-All Share Index	15-year Medium Coupon Gilts Index	IL Gilts Index (5% inflation)
Nominal yield	3.86%	8.21%	3.56%
Annualised yield	N/A	8.38%	3.59%
MVA	1.1010	0.9682	1.0293

Further details about the yields and the Market Value Adjustment (MVA) in Section 2.3 are given in Notes 1 and 2.

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2.4 *MFR Liability Valuation*

Non-Pensioners	Member A age 35		Member B age 52	
	Fixed pension	LPI pension	Fixed pension	LPI pension
(a) Value on neutral basis				
1. Pension @ MFR pension age (55)	1,095.56	1,095.56	562.43	562.43
Valuation factor (£1 p.a. pension plus 50% widow's pension after NRA)	1.8560	2.6528	8.2742	11.8260
Value	2,033.36	2,906.31	4,653.67	6,651.32
2. Widow's pension on death before NRA	250.00	250.00	250.00	250.00
Valuation factor (£1 p.a. pension)	0.2320	0.3560	0.1370	0.2020
Value	58.00	89.00	34.25	50.50
3. Total value on neutral basis	2,091.36	2,995.31	4,687.92	6,701.82
(b) Switching adjustment	1.050	1.050	1.015	1.015
(c) Market value adjustment				
Proportion in equities/MVA	100%/1.1010	100%/1.1010	30%/1.1010	30%/1.1010
Proportion in gilts/MVA	0%/0.9682	0%/1.0293	70%/0.9682	70%/0.9682
Weighted MVA	1.1010	1.1010	1.0080	1.0080
(d) Expenses (total assets < £50m)	4%	4%	4%	4%
MFR liability (inc. expenses)	2,514.43 + 3,601.23 = 6,116		4,988.36 + 7,131.32 = 12,120	

Details concerning the above table are given in Notes 3 to 8.

Pensioners	Member C age 55		Member D age 70	
	Fixed pension	LPI pension	Fixed pension	LPI pension
Proportion married	0.8000	0.8000	0.7464	0.7464
Net discount rate	8.38%	4.09%	8.38%	4.09%
Pension in payment	500.00	500.00	500.00	500.00
Valuation factor (£1 p.a. pension plus 50% widow's pension)	10.5492	16.0283	8.1406	11.3421
Expenses (total assets < £50m)	4%	4%	4%	4%
MFR liability (inc. expenses)	5,485.58 + 8,334.72 = 13,820		4,233.11 + 5,897.89 = 10,131	

Details concerning the above table are given in Notes 9 and 10.

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2.5 *Notes*

1. Relevant yields are for the last working day before the MFR Effective Date.
2. The MVAs should be calculated using the following formulae:

$$\begin{aligned} \text{Equity MVA} &= 4.25\%/3.86 \\ \text{Fixed interest MVA} &= .08\, a_{\overline{15}|} + v^{15} \text{ @ } 8.38\% \\ \text{ILGS MVA} &= \left(\frac{1.08}{1.04} - 1\right) a_{\overline{15}|} + v^{15} \text{ @ } 3.59\%. \end{aligned}$$

3. For the MFR liability valuation tables, assume an even spread of birthdays unless the data do not justify it, in which case use years and months with the actuarial factor interpolated between the two integral ages.
4. The neutral basis is that with the equity discount rate up to the point of payment, and the gilt discount rate during payment.
5. All pre-retirement revaluations have been allowed for in the benefit calculation, not in the actuarial factors (except for widows' death before retirement benefits). Statutory revaluation should be at 4% p.a. during the deferred period. For deferred pensioners, use the actual increase in RPI up to the calculation date and 4% p.a. for the future, subject to a 5% p.a. cap over the total deferred period.
   [Although not applicable to this example, for valuation of GMPs which are subject to ¶148 orders, use actual ¶148 orders up to the calculation date and assume future ¶148 orders at 6%].
6. Example (a) assumes that the next pension increase is in 6 months' time. The calculation of $\ddot{a}^{(12)}$ was the close approximation of $(a + 0.542)$ at the net rate of interest. Where the actual timing of increases is different, then an appropriate adjustment should be made.
7. Widows' death before retirement benefits should be valued using the yield on gilts at the point of death, adjusted as appropriate for revaluations. Although not required under ¶84 of PSA1993, this example assumes that the scheme's rules provide for revaluation between the date of leaving and the date of death at the lower of RPI and 5% p.a. Revaluation at 4% p.a. has been assumed in this example. For simplicity, the switching adjustment and the MVA should be the same as for the valuation of the main benefit.
8. For Member B in this example the matching asset for the LPI-based liability is fixed-interest gilts, as they produce a lower MVA than ILGS.
9. For Member D the proportion married is $0.8 \times l_{67}/l_{57}$ (before the 2-year age deduction).
10. For valuing the fixed pension, use the current yield on the Fixed-Interest Index, annualised and rounded to 2 decimal places. For the LPI-based pension, use the higher of the annualised net valuation rates implied by the Fixed-Interest Index (1.0838/1.05 –1 = 3.22%) and ILGS (3.59% + 0.50% = 4.09%), rounded to 2 decimal places.

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3. SPECIMEN SCHEDULE OF CONTRIBUTIONS

3.1 *Basic Data*

3.1.1 A scheme provides a pension of 1/60th of salary for each year of service, an attaching 50% spouse's pension, a 5-year guarantee period and an NPA of 65. The scheme has three members. The first has just reached age 65, with a pension of £5,000 p.a. The second has just left employment at 61, entitled to a deferred pension at leaving of £2,500 p.a. (having had 10 years of service and having had a salary of £15,000 p.a. at date of leaving). The third is currently in active employment, is aged 40, has a salary of £20,000 p.a., and has completed 15 years of service.

3.1.2 Pensions in payment are guaranteed to increase in line with LPI, and statutory revaluation applies in deferment. Pensions in payment are paid monthly in advance, and are increased at the beginning of each scheme year with pro-rata increases granted in the first year.

3.1.3 The market value of the assets of the scheme as at the valuation date is £126,000. Assume that 80% of these are invested in equities and 20% in fixed-interest bonds.

3.1.4 Assume that the valuation is carried out on a scheme anniversary date.

3.1.5 At the valuation date:

(a) the dividend yield on equities is 3.70%;

(b) the gross redemption yield on gilts (convertible half yearly) is 7.56%, which is equivalent to an annual rate of 7.70%; and

(c) the gross real redemption yield on index-linked gilts (convertible half yearly) is 3.47%, which is equivalent to an annual rate of 3.50%.

3.2 *Significant Areas not covered by this Note*

3.2.1 For illustrative purposes we have ignored pre-retirement mortality, which should be PA(90) rated down by 2 years.

3.2.2 There is no application of the equity easement.

3.2.3 The schedule of contributions being completed at a date after the effective date of the MFR valuation is not covered.

3.2.4 The valuation of assets is not covered.

3.3 *MFR Liability Valuation*

The current MFR position would be calculated as follows:

(a) *Pensioner liability*

Use a net interest rate of the higher of (a) 4.00% (= 3.50% + 0.5%); and (b) 2.57% (=1.0770/1.05 –1, i.e. current fixed-interest gilt yields with 5% pension increases).

At age 65, the proportion married is $0.8 \times \frac{l_{62}}{l_{57}} = 0.7798$.

Annuity after adjusting for pension increase timing = 12.8680.

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Liability = 5,000 × 12.8680 = 64,340.

(b) *Deferred liability* (*ignoring pre-retirement mortality*)
Annuity based on net 4.35% (= 1.08/1.035 – 1) = 12.7336 (= 11.0533 + 0.5 × 0.8 × 4.2008).
Annuity after adjusting for pension increase timing = $12.7336/1.035^{\frac{1}{2}}$ = 12.5165.
(For an individual, the adjustment may be based on individual circumstances.)
Adjustment for switch to gilts = 1 + (0.005 × 4) = 1.02.
Pension at NPA = $2{,}500 \times 1.04^4$ = 2,925.
Liability before MVA = $2{,}925 \times 12.5165 \times 1.02 / 1.09^4$ = 26,455.
MVA (equities) = 4.25/3.70 = 1.1486.
MVA (fixed-interest gilts) = $0.08 \times a_{\overline{15}|} + v^{15}$ = 1.0262 @ 7.70%.
The long-term real rate of return on index-linked stocks under the MFR basis is $\frac{1.08}{1.04} - 1$.
MVA (index-linked gilts) = $\left(\frac{1.08}{1.04} - 1\right) \times a_{\overline{15}|} + v^{15}$ = 1.0399 @ 3.50% (current annualised gross real redemption yield on ILGs).
The fixed-interest MVA should be used for LPI, since this produces the lower liability.
Liability after MVA = 26,455 × (0.4 × 1.1486 + 0.6 × 1.0262) = 28,443.

(c) *Active liability* (*ignoring pre-retirement mortality*)
Annuity based on net 4.35% (= 1.08/1.035 – 1) allowing for the timing of the first pension increase = 12.5165.
Adjustment for switch to gilts = 1 + (0.005 × 10) = 1.05.
Accrued benefit = 20,000 × 15/60 = 5,000.
Pension at NPA = $5{,}000 \times 1.04^{25}$ = 13,329.
Liability before MVA = $13{,}329 \times 12.5165 \times 1.05 / 1.09^{25}$ = 20,315.
Liability after MVA = 20,315 × 1.1486 = 23,334.

(d) *Balance sheet*
Past service liabilities = 64,340 + 28,443 + 23,334 = 116,117.
Expenses = 0.04 × 116,117 = 4,645.
Minimum funding liabilities = 116,117 + 4,645 = 120,762.
Market value of assets = 126,000.
Surplus = 5,238.

Minimum funding level = 104.3%.

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3.4 *MFR Regular Contributions*

3.4.1 Assume that neutral conditions apply throughout.

3.4.2 In this case, we have ignored new entrants, pre-retirement mortality and the probability of leaving early. We have also assumed that there are no identifiable expenses over the schedule period, but we have allowed for the additional MFR expense reserve associated with the extra benefit accrual over the next 5 years.

Projected benefit at NPA if member leaves in 5 years' time = $20{,}000 \times 1.06^5 \times 1.04^{20} \times 20/60 = 19{,}548$.

Projected benefit at NPA if member leaves now = 13,329.

Present value of 5 years' accrual = $(19{,}548 - 13{,}329) \times 12.5165 \times 1.05 / 1.09^{25} = 9{,}478$.

Expenses = $0.04 \times 9{,}478 = 379$.

$$\text{Future service rate} = \frac{9{,}478 + 379}{20{,}000\overline{a}_{\overline{5}|}} = 10.6\%.$$

(Annuity at interest rate of 1.09/1.06 – 1 = 2.83%, assuming contributions paid continuously.)

This approach is acceptable for an individual calculation. In practice such a rate would need to be checked against the minimum contribution rate.

3.5 *MFR Contribution Adjustment*

The current MFR position, assuming an immediate fall to neutral conditions (i.e. equity yield = 4.25%, annualised fixed-interest gilt yield = 8.00%), would be as follows:

(a) *Pensioner liability*

Annuity based on net 4.00% = 12.8680.

Liability = $5{,}000 \times 12.8680/1.0399 = 61{,}871$ (dividing by the index-linked MVA).

(b) *Deferred liability*

Annuity based on net 4.35% = 12.5165.

Adjustment for switch to gilts = $1 + (0.005 \times 4) = 1.02$.

Liability = $2{,}925 \times 12.5165 \times 1.02 / 1.09^4 = 26{,}455$ (no MVA required).

(c) *Active liability*

Annuity based on net 4.35% = 12.5165.

Adjustment for switch to gilts = $1 + (0.005 \times 10) = 1.05$.

Liability = $13{,}329 \times 12.5165 \times 1.05 / 1.09^{25} = 20{,}315$ (no MVA required).

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(d) *Notional asset value*
Impact of immediate fall to neutral conditions = 0.8 × 1/1.1486 + 0.2 × 1/1.0262 = 0.8914.
Notional market value = 126,000 × 0.8914 = 112,316.

(e) *Balance sheet*
Past service liabilities = 61,871 + 26,455 + 20,315 = 108,641.
Expenses = 0.04 × 108,641 = 4,346.
Minimum funding liabilities = 108,641 + 4,346 = 112,987.
Notional market value of assets = 112,316.
Deficit = 671.

Minimum funding level = 99.4%.

(f) *Amortisation of surplus/deficit*
After reversion to neutral conditions, there is a deficit of 671.
Spreading this over 5 years, addition to minimum contribution rate $= \frac{671}{20{,}000 a_{\overline{5}|}} = 0.7\%$.
(Annuity at interest rate of 1.09/1.06 − 1 = 2.83%, assuming contributions paid annually in arrears) or, level contributions of $\frac{671}{a_{\overline{5}|}} = £173$ p.a. for 5 years.

3.6 *Total MFR Contribution Rate*

MFR regular contribution	10.6%	10.6%
MFR contribution adjustment	0.7%	£173
Total contribution rate	11.3%	10.6% + £173

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